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GATT SOVIET BREAKUP SUPPLY AND DEMAND
TRADE SUBSIDY BARRIERS ENVIRONMENT
FOOD SECURITY RURAL DEVELOPMENT
AGRICULTURE

Agriculture's Changing Horizon



Agriculture
Outlook '93

69th Annual Outlook Conference
U.S. Department of Agriculture
December 1-3, 1992

Proceedings

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PREFACE

These pages contain speeches presented during "Agriculture's Changing Horizon", the U.S. Department of Agriculture's 69th Annual Agricultural Outlook Conference. Included are all papers submitted by those participating in the program.

The Conference took place at USDA Headquarters in Washington, D.C., December 1-3, 1992, with about 1,000 people in attendance. Some 120 speakers and panelists representing government, agribusiness, and agriculture participated in 33 sessions.

This book is organized by order of presentation during the Conference. Focus sessions covered creative solutions for the challenges facing agriculture, trade issues, food labeling and nutrition, and rural development. Concurrent sessions presented the outlook for the farm economy and major commodities and covered many current policy issues.

Though distributed in previous years, the Chartbook will not be made available this year. Thus, all speeches are inclusive of charts and any other visual aids displayed during presentations. To purchase additional copies of these Proceedings, call 1-800-999-6779 or write ERS-NASS, 341 Victory Drive, Herndon, Virginia 22070. Audio and video cassette tapes of Conference sessions are also available. Information about all of these materials and other publications of interest can be found at the back of this book.

Recipients of these Proceedings will be sent preliminary information on next year's Conference, Outlook '94.

For further information contact Raymond Bridge at (202) 720-5447.



JAMES R. DONALD
Chairperson
Outlook Conference Steering Committee

World Agricultural Outlook Board
Room 5143 South Building, USDA
Washington, D.C. 20250-3800

March 1993

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Outlook '93

For Release: Tuesday, December 1, 1992

AGRICULTURE'S CHANGING HORIZON

The Honorable Edward Madigan
Secretary of Agriculture

Good Morning, and welcome to this 69th United States Department of Agriculture Outlook Conference.

We are assembled here to talk about agriculture's changing horizon.

Change -- now that's an interesting word that I have heard a great deal about recently.

The theme developed by the people who started planning this conference several months ago was "The new forces of change." I bought the idea. What they didn't tell me was the full extent of the changes they might have had in mind. I think the next Secretary of Agriculture should keep an eye on these people.

We're here to identify forces of change . . . assess those forces . . . and give some appraisal as to what we think is likely to happen in the future.

We will appreciate your participation in this process over the next two and one-half days.

In preparing to talk with you, I started by looking at the proceedings of the Agriculture Outlook Conference 10 years ago. I wanted to see how well that conference anticipated the changes ahead.

It was a good preview of the coming year, but do you know what I didn't find?

Farm exports in 1981 were a record-high. They were off some in 1982. But I didn't find anyone at the Outlook Conference in 1982 who predicted a huge drop in farm exports within four years. Had someone mentioned it, that person probably would have been booed off this stage. After all, two weeks before that Outlook Conference in 1982, one group had adopted a goal of "75 by 85." The goal was \$75 billion in agricultural trade by 1985.

In reality, a steep drop in our farm exports in the early '80s plunged American farmers into a deep and painful recession.

In those troubled years our No. 1 farm market -- the domestic market -- set records year after year. The nation enjoyed a prolonged period of strong economic growth. But farmers didn't. Let's never underestimate the importance of American farm exports on the health of our agricultural economy. I can't recall a period of agricultural prosperity that was not accompanied by increasing agricultural exports.

Ten years ago this month, we were putting a record corn crop in the bin -- yields were at an all-time high. Nobody at that 1982 conference predicted that corn yields the next year would take the steepest plunge since 1901. And the 1983 drop was surpassed by a bigger drop in 1988. Never underestimate the ability of the weather to upset the best laid plans.

In 1982 we were recovering from double-digit inflation in each of the three previous years. Nothing saps the vitality of the economy, and steals from people, and undermines society, like unbridled inflation. We tamed inflation, but I didn't find anyone who predicted that by 1992 the inflation rate would be only about 3 percent.

Ten years ago interest rates on CCC crop loans were 9-3/4 percent, down 7 points from the year before. Nobody predicted that by last month these interest rates would be 3-1/8 percent, the lowest in 30 years.

You may recall that 1982 farm land prices were record high. I didn't find anyone who was predicting that land prices 5 years later would be down more than one-fourth.

Farmers had borrowed to try to keep up with inflationary costs, and they had borrowed against an anticipation that didn't materialize; and lenders had led the way. Let's never understate the importance of risk management.

Farm debts were peaking in 1982, following a huge runup in farm debts in the preceding five years. The farm debt increase alone in those five years exceeded total farm debts just a short while earlier. But nobody predicted 10 years ago what was about to happen to over-extended farmers. And nobody predicted that even the farmer-owned, independent, strong Farm Credit System would within the next five years be leaning on the government for help.

But neither did anyone suggest that over the next several years farmers would work off \$60 billion of their 1982 debts and reverse the 30-year trend of debt buildup.

We came to the aid of farmers. USDA spent more than \$100 billion on farm price support programs in a half dozen years from 1982 to 1987. That was more than had been spent on price supports in the previous 50 years, going back to the beginning of farm price support activities in the Great Depression.

Looking at it another way, at the end of this fiscal year we will have spent more on USDA food assistance programs in the last three years than we spent on 50 years of farm price support activities up to 1982.

Those emergency farm price support expenditures in the early 1980s were an investment in our future -- to get the agricultural economy on a firm base again. And we turned it around. Gross cash income and net cash income reached successive record highs each year from 1987 through 1990. Farm exports increased each of those years, and now are second only to 1981.

We fashioned the 1985 and 1990 farm bills to gave farmers greater opportunities and freedom to plant and manage for a profit. And we did that in the face of those who would have shackled farmers with controls, and would have written off farm exports as the best opportunity for growth. We should stay ever alert and never buy the pessimism of those who think our future lies in a government-regulated farm economy.

In 1982 we didn't have any land in a long-term land retirement system. I didn't find anyone who was predicting that by 1992 we would have more than 36 million acres of highly erodible farmland in the Conservation Reserve Program: This is the most successful program in history built around the idea of good soil and water conservation. I hope nobody overlooks the fact that this is an incentive program where government works with farmers to attain mutually desirable goals.

On the nation's broader horizon, I didn't find anyone forecasting in 1982 that within 10 years the Cold War would be over and the Berlin Wall would fall . . . that Eastern Europe would be free . . . and that the Communist dominated Soviet Union would within the 10 years be embracing market economics. Yet those events happened and have had a tremendous impact on the United States and world agriculture -- and what happens in that part of the world over the next few years will heavily affect your life and mine. Perhaps nothing else will matter quite as much.

The United States paid a stiff price in the form of increased federal debt to stop the Cold War and stop aggression through military preparedness and foreign assistance to stem the march of communism. But we changed the world at a very critical time in history and made it safer for us and our children. It takes time, and some turmoil, for the economy to adjust from heavy defense spending to a lower level. But we are well along with that now, and we can adjust to peaceful economic needs and allocate resources to other ends.

In 1982 I didn't find anyone who was foreseeing that we would be embraced in a worldwide search for new and fair rules of international trade in agriculture with negotiations that would consume more than half of the ensuing 10 years -- without being totally resolved as we meet here today.

We have been determined during the GATT negotiations that we will not settle for less than major changes in reducing unfair world-wide barriers to trade. We view unfair trade barriers for what they are: barriers to economic growth and prosperity. Against tremendous pressures to settle for less, we have held our ground. With the breakthrough with the EC two weeks ago on oilseeds and reductions in internal farm supports and external export subsidies, we are now close to releasing a waterfall of new and invigorating economic forces throughout the world.

Of all the things we can do to stimulate the economy, nothing measures up to the potential contribution of trade to fashion a vigorous close of the century. The free flow of fair, unrestricted trade comes at no budget cost; instead, it enhances budget revenues, it makes jobs, it puts money in people's pockets, and it spreads its benefits throughout society.

The elements to do that are in the agreements we reached with the EC two weeks ago. They call for a 20 percent reduction in trade-distorting internal farm supports from a 1986-88 base. This requires no further cuts by the U.S. than those already made. The agreement calls for a 21 percent reduction in the volume of subsidized farm exports and a 36 percent reduction in subsidy outlays from a 1986-90 base. This is equivalent to a 38 percent reduction in EC subsidized wheat exports from 1992 levels. The reduction in oilseeds acreage, with set-asides, and binding arbitration if the agreement is breached, is a real plus for U.S. oilseed producers.

I didn't find an inkling 10 years ago that by now we would have a North American Free Trade Agreement -- the most far-reaching trade agreement ever on this continent, one that encompasses the largest total economic activity of any trade group in the world, and holds a much brighter future for Canada, Mexico, and the United States.

These are positive developments for agriculture and the Nation. Let's not let anything deter us in these new ventures, nor take us a step backwards.

In the proceedings of the Outlook Conference of 10 years ago I did not find reference to such words as: Ethanol fuels. Commodity certificates. EEP. Flex acres. Sodbuster. Swampbuster. Alternative agriculture. And Alar.

Nor did I find reference to those terms of endearment that have made my life so pleasant: The spotted owl. BST. The food pyramid. Wetlands regulations. Animal rights. Global warming. And food labeling.

What this review tells us, I think, is that change -- inevitable change -- often follows courses and leads to events that we, as mere mortals, cannot foretell.

So as we look ahead today at the horizons of change for agriculture, let us be humbled by our experience -- yet be bold.

I think that we can identify some winds of change that will blow with persistent and increased intensity in the years ahead.

One enduring force for change is the search for new industrial uses for agricultural products. For these reasons:

- The need to increase the demand for farm products, with resulting improvement in farm income, so that farmers can meet ever-increasing production costs and farm family living costs.
- The need to substitute the use of renewable resources for decreasing supplies of nonrenewable resources.
- The need to develop and harness more environmentally friendly resources in our drive for clean air and clear water and a better environment. New uses is the subject of the new Yearbook of Agriculture, out today and on sale outside the Auditorium.

Another enduring force for change is the search for fair rules of international trade:

- We need to open the way to increase those farm exports where we have a competitive advantage in the world, thus increasing our farm income and boosting national economic activity.
- We need to stimulate world trade in agricultural and industrial commodities to offset the drag of static growth that now slows world economies.
- We need to reduce the costs and the drain on nations and societies of sustaining unfair trade barriers and export subsidies. American farmers should be given a chance to compete with foreign farmers -- instead of having to compete with foreign treasuries or against capricious, protective, and wasteful foreign regulations.

Another enduring force for change is the search for innovative and productive agricultural research:

- Research is the well from which we draw water to sustain our economic life and improve our levels of living.
- We must have good research to remain competitive in world agriculture and not be weakened or swept aside or overwhelmed by discoveries elsewhere.

- We need good research to broaden the forms of trade merchandise to reach rapidly increasing population numbers in other lands, both for their benefit and for ours. Agriculture is a people business -- and future population growth will be overwhelmingly outside our shores.

Another enduring force for change is the search for sound farm programs based on incentives:

- Government should be a partner with farmers in steering desirable change, not be a policeman or a foreboding oppressor.
- Incentives are superior to, and get more results than, regulations and controls.
- Farmers and society can share the cost and goals of guiding desirable agricultural actions through incentives -- while protecting farmers' private property rights.

Another enduring force for change is the search for better delivery of our USDA services:

- We need to keep our costs as low as practical, and shorten the delivery time of reaching our farm and non-farm families with high-quality USDA services.
- We need to adjust to changes among our constituents so that USDA can better anticipate and understand our clients' needs.
- We must train our USDA staff and improve the performance of our staff on whom we and our clients depend for outstanding service. But let's use good sense and good judgment and look at overall synchronized plans and not at isolated cases. Let's trim fat where we find it -- but not sever the muscle. Different is not better. Better is better.

Another enduring force for change is the search for policies that reflect the wishes and best interests of our USDA client groups:

- A functional government must be responsive to the people in its society.
- A lively organization must be adjustable and thrive on change.
- An effective democracy must furnish the avenue of change, provide a reasoned forum for the discussion and resolution of competing viewpoints and policies, and maintain a stable environment for engaging the gears of change. But let's be aware of self-appointed experts with narrow views whose desire to use dramatic means to bring attention to themselves in the public arena is stronger than their desire to make measured progress for all. Let's be better prepared in agriculture to speak with a unified voice -- based on sound science and sound economics -- and be quick to respond in the public arena if necessary.

Another exciting force for change is the developing realm of biotechnology. The coming biotechnology age in agriculture promises to make faster and more far-reaching progress that will dwarf the advances of the preceding age of agricultural mechanization and the chemical age:

- Biotechnology is more environmentally friendly and is our best chance to harness pest and disease resistance, reduce the use of chemicals and fertilizers, and enhance food safety.
- Biotechnology will speed our advancements in quality and content of crops and livestock and leapfrog over the narrow boundaries and snail's pace of crossbreeding and natural selection which have prevailed for the last 10,000 years.
- We can stretch our seasons, now delineated by frost; we can cope better with drought and heat and salinity; and we can competitively serve a world-wide market with a cornucopia of treasures that since the beginning of time have been hidden among the gene messengers nestled in the chromosomes of nature. We must not let fear mongers deter us from unveiling these benefits.

It is a great time to be alive and to be active in agriculture.

Our goals should be fair food and fiber prices and improved incomes that will allow farm families to maintain their ability to maintain our natural resources . . . be competitive . . . invest in modern equipment . . . pay for modern practices . . . and enjoy healthy, happy, and productive lives as members of a rural community economic and social life with good schools, good health care, and good living.

Our goal also should be to provide healthful, safe, and nutritious food, and plentiful high-quality fiber for consumers in adequate amounts, and serve those who are disengaged from the mainstream of economic life and who need our compassion and our aid.

Overall, I would like to suggest that whatever changes come, the United States Department of Agriculture will serve with distinction and with pride.

Abraham Lincoln called it the "people's department." That is how the Department of Agriculture was born. That is the way it has lived. The partnership between USDA and its clients is unequalled in Government. That is why I believe the USDA will serve us well through the changes it anticipates in the coming years, as well as those changes it does not foresee, but nevertheless encounters and copes with along the way.

Never has a government department done more for the people of a nation through war and peace . . . through prosperity and adversity . . . through ferment and through tranquility . . . and through Democrat and Republican leadership.

This is the last time that I will speak to you at your Outlook Conference. As I leave, I would like to congratulate the people in this Department of Agriculture for your professionalism . . . your ingenuity . . . your dedication . . . your loyalty . . . your responsiveness to the people of the United States . . . and for standing tall in carrying out your responsibilities of government in a democratic society.

To you who are the patrons of this Department, let me say that the forces that have helped make this Department great are, in major measure, attributable to your advice . . . your guidance . . . your insistence . . . and your respect for this Department.

Together we have demonstrated our love and genuine concern for the land . . . for our natural resources . . . for the farm families who each year transform the soil and the sun into life-giving food and fiber . . . and for the consumers, especially the less fortunate, whom we serve.

This Outlook Conference is one avenue for us to share our information and insights with you; and for you, equally, to give us your advice and your help. Let us get on with that challenge and that opportunity so that what we do here will help make this a greater United States of America.

Thank you and God bless you.

Strictly Embargoed for Release at 8:00 a.m., December 1, 1992

U.S. AGRICULTURAL OUTLOOK

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The 1993 outlook calls for further modest growth in the farm economy. Cash farm income could move a little higher in response to continued large marketing receipts, increased Government payments and only a modest rise in production expenses. The value of farm assets will increase slightly, debt will be a little greater and the debt-to-asset ratio will remain at the healthier lower levels of recent years.

Cash farm income in 1993 could increase slightly, perhaps 1 to 2 percent from \$60 billion estimated for 1992. However, there remains uncertainty about the 1993 outlook and cash income could vary from \$58 to \$64 billion.

Net farm income in 1993 could be down one-tenth or more, perhaps falling in the range of \$42 to \$48 billion. In 1992, net farm income will be close to the 1990 record of \$51 billion, well above earlier expectations because of larger commodity production and lower expenses. Also, the buildup in crop stocks is boosting net farm income in 1992, while sales from these stocks will add to net cash income in 1993.

Total farm output in 1992 will be 5 percent above 1991 and will likely decline only slightly in 1993, as smaller crop production is nearly offset by higher animal product output. This large agricultural output, coupled with moderate increases in inflation and marketing costs, will limit the increase in retail food prices to 2-4 percent. This would follow an increase of slightly over 1 percent expected for 1992, a year of declining meat prices, particularly for pork.

Large commodity output in 1993 will find expanded markets at home and stronger demand abroad. Domestic use of crops will be up 4 to 5 percent, led by more than a 5-percent increase in feed use in response to expanded animal product output and generally lower prices. Crop food use and animal product demand will rise with population growth and continued economic recovery.

International demand for U.S. agricultural products will remain strong in line with population growth and economic expansion in a number of countries, particularly in East Asia and North Africa. The value of U.S. agricultural exports in fiscal 1993 is expected to total \$41.5 billion, slightly below the 1992 level of \$42.3 billion but third highest ever -- the record is \$43.8 billion in 1981. The value of exports of horticultural and animal products are forecast to exceed 1992 levels, while bulk commodities will decline. Imports are likely to slip in fiscal year 1993, so the agricultural trade surplus will decline one-half billion to \$17.5 billion.

The longer-term outlook is for agricultural exports to be a growth market for farmers and the economy. The export growth will be in response to economic growth, especially in less developed countries, and reforms in farm and trade policies.

WORLD COMMODITY OUTLOOK

World production is increasing for most crops in 1992/93. Favorable weather has upped potential output in a few major producing countries, including the United States, the Former Soviet Union (FSU) and India. Animal product output will reach a new record as pork and poultry supplies continue to increase.

World commodity demand will be stronger in response to: Real economic growth of 2-1/2 to 3 percent, up from 1-1/2 percent estimated for 1992, and population growth continuing at about 1.7 percent. However, shorter supplies in some countries and/or higher prices will dampen consumption of grains, particularly in Eastern Europe. For the United States, grain exports are up slightly, but they are being held down by expanded or continued large crop supplies in competing countries and/or importing countries. These same factors will mean lower cotton exports. U.S. exports of animal and horticultural products will continue to increase in 1992/93.

U.S. domestic demand for commodities will be stronger in 1992/93, reflecting: Expansion in animal product output of 2 1/2 to 3 percent and 5 percent greater use of grains and high protein meals; U.S. economic expansion of 2-1/2 to 3 percent; and population growth of around 1 percent.

Total Grains

World 1992/93 grain production, consumption and ending stocks are expected to rise from last year's levels, but trade is projected down. However, these aggregate world projections mask a number of significant country and regional developments. A larger crop and smaller imports by the FSU is a major factor in world projections, especially trade. However, there are numerous other

developments, such as the drought which sharply reduced grain production across much of Europe. Eastern Europe will likely register the largest impact, as reduced supplies and limited resources to purchase imports will accelerate the cuts in use already well underway because of market reforms. Likewise, a drought in southern Africa last winter (their late spring and summer) slashed grain production and is leading to large grain imports (largely corn) by a region that is normally a net exporter.

Global grain production is forecast up 3 percent, as declining output in many countries is overwhelmed by gains in the United States and FSU. In fact, global output excluding the USSR and the United States is down 4 percent from a year earlier, led by a drop of 50 million tons (17 percent) in Europe. World grain consumption is projected up slightly from a year earlier. The larger crop may keep FSU grain consumption from declining again, but the combination of market reforms and drought-reduced crops is projected to lead to a 16-million ton reduction in use in Eastern Europe. If Eastern Europe is excluded, consumption would show a 1 1/2 percent year-to-year rise.

Forecast 1992/93 U.S. grain production is up 25 percent from last year as all the feed grains achieved record yields and wheat yields were only marginally below the record. While total 1992/93 use is expected to be up from last year, largely because of increased domestic use, the huge production gains will be overwhelming and stocks will rise. However, total grain ending stocks will remain well below the levels of the mid-1980's.

Wheat

The global wheat outlook for 1992/93 is highlighted by slightly smaller supplies, use and trade, but larger ending stocks. While world wheat production is up 2 percent from last year, lower carryin stocks are reducing total supplies. Output gains are dominated by the FSU, the United States and China. Aggregate output in the remaining countries is down 7 percent, with significant reductions expected in all the major competitors, except Australia. Eastern Europe accounts for most of the forecast reduction in 1992/93 global consumption, while most of the projected rise in ending stocks is in the FSU and United States.

The outlook for U.S. wheat in 1992/93 is for slightly higher supplies, higher domestic use, and exports near last year's level. The slightly higher total use will not quite match production and imports, so 1992/93 ending stocks are expected to be up 50 million bushels.

Wheat harvested acres are up 8 percent because of smaller area idled under government programs and higher prices. While there were various unfavorable weather conditions, total wheat yields were only 0.1 bushels per acre below the 1990 record as yields of spring wheat rose well above the previous records.

Total use is projected up slightly from 1991/92 because of an expected rise in food use. Wheat, feed and residual use and exports are expected to remain near last year's levels.

World wheat trade in 1992/93 is forecast down almost 6 percent from last year's record. While a number of countries are expected to show significant gains or reductions in imports from last year, the FSU and China continue to be the main focus. Import declines of 37 and 25 percent, respectively, are forecast for China and the FSU.

Despite the smaller crops in most competing-exporters, the reduced world trade and relatively large stocks means continued strong competition for markets. The EC entered 1992/93 with record stocks, which will provide ample supplies to export, despite a sharply reduced 1992 crop. Canada also entered the year with relatively high stocks and, despite lower 1992 crop supplies will remain relatively large. However, Canada's exports will be limited by a poor quality crop. Also, several small exporters have much reduced exportable supplies. Thus, while U.S. exports are forecast down slightly on a July-June year, because of lower world trade, the U.S. share of the world market will rise.

U.S. wheat plantings for the 1993 crop will likely be up because of less acres idled under government programs and higher prices. However, production will hinge mostly on how close yields come to the near-record level attained in 1992. As usual, foreign production will importantly depend on the FSU. Planting progress reports point to a drop in winter grains in the FSU. Given normal weather, a rebound in production can be expected in Europe. A major new uncertainty is how producers in the EC will respond to new, reduced support prices and required idling of cropland, although relative yields seem to favor wheat over other crops. The major foreign competitors' exportable supplies will likely remain relatively large, as their carryin stocks drop but remain relatively high.

Coarse Grains

The outlook for world coarse grains is dominated by the huge U.S. corn crop. However, outside of the United States and FSU the situation is similar to wheat--declining production, use and stocks. World coarse grain trade is expected to drop this season, mainly because of a larger crop and reduced imports by

the FSU. Smaller crops in Europe and Canada will mean relatively tight world supplies of barley, rye and oats, but large U.S. crops will push up corn and sorghum supplies. Although feed wheat will likely prevent any gains in Korea's corn imports, expected import gains in a number of countries and reduced competition from China are expected to push up 1992/93 U.S. corn exports.

World coarse grain production for 1992/93 is forecast up 4-1/2 percent from last season because of the huge U.S. crop and larger FSU production. The rest of the world is expected to show a significant decline from 1991/92, led by a 19 percent drop in Europe. Global supplies are up 3 percent as the larger U.S. production overwhelms the smaller foreign output and reduced global carryin stocks. World consumption is forecast to rise 2 percent but foreign use is expected to rise only marginally. However, if the sharp reduction in Eastern Europe consumption is excluded, foreign consumption shows a 2 percent year-to-year gain.

U.S. 1992/93 feed grain supplies are forecast up 15 percent as the larger crop will much more than offset the smaller carryin stocks. While larger exports and domestic use are expected to push total use 5 percent above a year earlier, it will remain well below production and ending stocks will rise to their highest level since 1988/89.

This year's record corn crop of 9.3 billion bushels is up 25 percent from 1991, as yields rise 19 percent from last year and are 8 percent above the 1987 record. Despite record yields for the other feed grains, production is mixed. Output changes from last year range from a 52-percent increase for sorghum to a 2 percent drop for barley. Domestic use of corn is expected to continue to expand in 1992/93, boosted by higher meat production and lower prices. Also exports are forecast up marginally from 1991/92. Despite the projected 5 percent gain in total use, it will trail production by more than 1 billion bushels. Corn stocks will exceed 2 billion bushels for the first time since 1987/88. Still, ending stocks of corn are forecast to remain well below the mid-1980's.

World corn trade was up 4 percent in 1991/92, largely on the strength from southern Africa. While this region's imports will decline slightly, they will remain large during the first half of the 1992/93 trade year. FSU corn imports are forecast down almost 30 percent. However, a number of other countries, such as Mexico and Eastern Europe, will import more. Mexico's higher imports are tied to large GNP gains and expanding livestock needs. Corn production dropped sharply in Eastern Europe and, while ongoing cuts in consumer subsidies and political, economic and structural reforms will reduce demand, import needs are up. However, limited foreign currency supplies will curtail imports.

For many years, the FSU has been the major determinant of the level of world corn trade and this year will be no different. While the larger FSU grain crop and procurements will reduce coarse grain coarse grain import needs, financial assistance will still be a key determinant in 1992/93 FSU imports of corn.

U.S. corn exports for 1992/93 are forecast up slightly, despite the expected reduction in world imports, because of reduced competition from China, South Africa and Eastern Europe.

Looking ahead to 1993, U.S. corn production will likely drop, assuming trend yields and lower planted acres in response to larger area idled under government programs and lower prices. Foreign coarse grain production will largely depend on the FSU production, but normal weather would lead to a sharp rebound in output in Europe. A major uncertainty is in the EC as producers respond to the reduced support prices and required idling of cropland. Historical relationships would indicate that coarse grains, especially barley, are at a disadvantage compared to other crops.

Rice

Global rice production in 1992/93 is forecast at 350 million metric tons, up 1 percent from last year's harvest, but down slightly from the record 1990/91 crop. Larger crops in Bangladesh, Indonesia and the U.S. account for much of the increase. Slightly smaller crops are forecast for India and Vietnam. Global consumption is forecast up, while world ending stocks are expected to decline 6 percent from last year. World trade in calendar 1993 is forecast to fall 2 percent to 13.9 million metric tons.

U.S. production in 1992/93 is forecast at 168.2 million cwt, up 9 percent from last year. Domestic and residual use is forecast to rise 3 1/2 percent, while exports are projected to increase 11 percent. U.S. market share is expected to rise to 17 percent in calendar 1993 compared with 15 percent in 1992. Carryout stocks in 1992/93 are forecast to rise 21 percent. The season-average price is forecast at \$6.10-\$6.60 per cwt, compared with \$7.53 estimated for 1991/92.

Given normal weather global, rice production could expand next year. World prices are expected to remain depressed as competitors continue to vie for limited expanding markets. Over the next several years, the marketing loan program will ensure U.S. export prices are competitive. However, as long as U.S. supplies remain relatively tight, exports will have to compete with expanding domestic use.

Oilseeds

The global oilseeds outlook calls for continued modest gains in use and trade, while inventories remain below the record levels reached in 1989/90. The protein portion of the oilseeds complex has been much weaker in recent years than the vegetable oil side and that trend is continuing in 1992/93. Vegetable oil use and trade have been more robust than for protein meals. Furthermore, global vegetable oil stocks have fallen sharply and are well below the peak surplus levels in 1987/88.

Shortfalls in high oil content oilseeds because of weather this past year have contributed to the improved vegetable oil situation and outlook. But, changing production support policies, particularly in the EC, will continue to be supportive of an improving price outlook for vegetable oils and oilseeds as we move into 1993/94.

Global oilseed production in 1992/93 is forecast at a record 224 million tons, led by gains in soybeans which are projected at 112 million tons, up nearly 6 percent from last year. Most of the gain is in the United States where soybean yields exceeded any previous high by nearly 10 percent. The unusually strong U.S. yield gains are mainly due to favorable weather. Yields also are being boosted by heavier concentration of acreage in the Corn Belt, where yields are relatively high. This year's large U.S. soybean crop is the highest since 1982/83 when the U.S. had over 70 million planted acres, compared with this year's 59 million. U.S. soybean stocks will rise to about 350 million bushels, but this is well below record levels reached in the mid-1980's, thanks to U.S. crush and soybean export gains in 1992/93.

U.S. soybean exports are benefiting from a gradual rise in global demand and a sharp reduction in supplies of other oilseeds, particularly rapeseed and cottonseed. South American soybean availabilities this fall are short, helping U.S. exports early in the season. New crop soybeans in South America are just being planted, mostly under favorable conditions and will be a big factor influencing U.S. exports later this marketing year. Increases in South American soybean production could be less than 5 percent, if yields are near average. So, U.S. soybean export market shares in terms of soybean and soybean meal could be around 42 percent up from the low of 39 percent reached in 1990/91.

The 1992/93 U.S. soybean crush is being supported by continued gains in both soybean oil and soybean meal demand. Livestock expansion will mean more feeding, while domestic soybean oil use is being boosted, in part, by slow growth in competing oils and fats.

U.S. projected soybean oil exports in 1992/93 are the highest since 1987/88, helped by an expansion in U.S. vegetable oil programs and a tightening in the global supply-use balance for vegetable oils. Some of the drawdown in foreign oil supplies is weather-related as both Canada and China's oilseed crops dropped sharply, as did the European Community's crops. But, with global oil use growing by 3 percent or more annually, a sizable rebound in vegetable oil production is required to prevent substantial more tightening.

Looking forward to 1993/94, global oilseed production could be up, even if output declines in the U.S. and the EC. A return to normal yields in Canada and China along with further area gains, particularly in South America for soybeans and sunflowerseed, would boost foreign production in 1993/94.

In the United States, area and/or production could expand for most seeds as relative soybean and sunflowerseed producer returns improve. Nevertheless, U.S. soybean availabilities could be down in 1993/94 while foreign production and other U.S. oilseed supplies increase. This points to a modest setback in U.S. soybean and soybean meal exports and for slow growth in the crush. The modest use decline however, could be exceeded by the drop in the crop. This suggests a decline in U.S. stocks and some strengthening in prices and producer returns.

Soybean prices will likely be supported by another strong year for vegetable oil, while soybean meal likely will continue to improve gradually. Demand for protein feeds is accelerating in several countries in Asia and Latin American, such as Mexico, but global growth in protein demand will likely be dampened by lagging use in the former Soviet Union and Eastern Europe.

Cotton

The world cotton outlook for 1992/93 is highlighted by a much closer balance between production and use. Output is projected at slightly over 87 million bales, down nearly one-tenth from 1991/92's record high as last spring's relatively low prices resulted in 4-percent smaller area. Yields are off 5 percent this season. China is accounting for more than half of this season's drop in global production, followed by the United States and the former Soviet Union. China's output is down about one-fifth because of insect problems and drought.

World cotton use, forecast at nearly 87 million bales, is up 2 percent in 1992/93, maintaining the growth rate of the past decade. Larger consumption is particularly evident in exporting countries such as China, Pakistan, India, and the United States. However, use in importing countries, mainly in Europe and the Far East, is down 3 percent this season. Thus, global trade is up

only slightly to nearly 23 million bales. This season's ending stocks are placed at 40.2 million bales, virtually unchanged from the beginning level and equal to 46 percent of use, moderately above the 5-year average.

The 1992/93 U.S. cotton outlook features both smaller production and use, and larger stocks. The crop is forecast at 16.2 million bales, down 8 percent from 1991 as 14 percent smaller harvested acreage more than offsets near-record yields. Use is expected to total 15.7 million bales, down 3 percent from last season. While mill use is projected to increase slightly to 9.7 million bales, the highest level since the early 1950's, exports are placed at 6 million, down one-tenth from 1991/92 because of strong competition abroad. Ending stocks are forecast at 4.3 million bales, 16 percent above the beginning level, equal to 27 percent of use and near the targeted level. With stocks building this season, early-season farm prices are below last year's average of 58 cents per pound.

An early look at 1993/94 points to a further buildup in U.S. cotton stocks as production may again exceed use. Although use prospects are fairly encouraging--in the 16-17 million-bale range--more production will be needed to achieve the 30 percent stocks-to-use ratio targeted in the current farm bill. To accomplish this goal, a preliminary 7.5-percent Acreage Reduction Program (ARP) for upland cotton was announced November 2. This compares with the 10-percent ARP in effect for the 1992 crop. A final ARP decision will be announced by the end of December, taking into account any changes in supply and demand which have occurred since October.

U.S. cotton exports may rebound a little in 1993/94 but growth will be tempered by static world trade and continuing strong foreign competition. Although global use is expected to rise further next season to a record level, most of the increase likely will be in major producing countries, continuing the trend of recent years. Thus, world trade may be limited to around 1992/93's projected 22.7 million bales. Assuming the U.S. export share falls within the 26-30 percent range of the past two seasons, U.S. exports could total 5.9 to 6.8 million bales, compared with the 1992/93 forecast of 6 million.

Sugar

In 1992/93 world sugar production is expected to exceed consumption for the fourth straight year. The continued buildup of stocks will prevent world raw sugar prices from breaking out of the 8-to-10 cents range where they have been locked for the past two years.

World sugar production in 1992/93 is expected to be similar to last year as increased production in the European Community, Australia, Russia, Thailand, and the United States is offset by lower output in Cuba, Southern Africa, and India. Large export availabilities in countries that traditionally export white sugar are likely to keep the international price premiums for white sugar low. This negatively affects the sugar reexport business of U.S. refiners.

U.S. sugar production is expected to increase for the third straight year in fiscal year 1992/93 to a record 7.55 million short tons. All of the forecast production increase is in beet sugar, up 9 percent from last season. Hurricane damage in Louisiana and Hawaii is keeping cane sugar output near last season's level.

If the current production and use forecasts hold, there will be no need for domestic sugar marketing allotments this year. However, if production increases continue to exceed the growth in consumption, marketing allotments will become necessary.

Increases in U.S. sugar use are out-pacing population growth. U.S. sugar deliveries are likely to increase about 1-1/2 percent in 1992/93, slightly ahead of last year's rate of increase. The demand for high fructose corn syrup (HFCS) is increasing slightly faster than sugar demand. Last year, HFCS accounted for 44 percent of combined sugar and HFCS use in the United States.

Sugar imports under the tariff rate quota are expected to supply 15 percent of U.S. domestic sugar needs in 1992/93.

Livestock and Poultry

World animal-product output likely will increase a little over 2 percent in 1993, following an expected rise of 1 percent this year and an increase of almost 2 percent in 1991. Red meat production will be about unchanged this year, but an increase of nearly 2 percent is expected next year. Pork output is expected to expand more than 3 percent in 1992 while beef production slips a little. Poultry meat production continues to expand. World output is projected to increase around 4 percent in 1992, about the same increase as anticipated for this year, but below the more than the 5 percent rise in 1990.

Total U.S. meat production in 1993 will increase about 2-1/2 percent from this year's record large output. Broilers will continue the long run upward trend and pork and beef output will also increase.

The U.S. cattle inventory at 100.1 million head on January 1, 1992, was up 1 percent from the 1991 level. The cow inventory at the beginning of the year was up almost 1 percent from a year earlier and the indicated calf crop for 1992 is up slightly. Producers are holding more replacement heifers than a year ago and a modest expansion in the cattle inventory appears to be underway. The January 1, 1993 inventory is expected to be up 1 to 2 percent.

Placements of cattle on feed were below the year-earlier level throughout 1991 and for the first quarter of 1992. Starting in the spring, placements increased and on October 1, 1992 the number on feed was up over 3 percent from the previous year. Larger calf crops, combined with lower calf and nonfed steer and heifer slaughter, will result in more feeder cattle available for placements in the coming months. Fed cattle marketings during 1992 will be down slightly from the year-earlier level. Marketings are expected to increase in 1993. Cow slaughter likely will increase slightly in 1993.

Average slaughter weights, while a little below the high levels of a year ago in recent months, have been at high levels this year. Average weights are not expected to change much in 1993 and beef production likely will rise 1 to 2 percent as total cattle slaughter increases. Beef production will be about 1 percent higher in 1992 than in 1991.

On a quarterly basis, pork production has shown large increases since the second quarter of 1991. Production is expected to increase about 8 percent this year. The larger output has resulted in lower hog prices that will average about \$7 per cwt below the year-earlier level this year. While hog prices have been down in 1992, they have still been at levels that at least cover cash costs for most producers. This likely will result in continued growth in pork output in 1993, perhaps up over 3 percent. Hog prices in 1993 are projected to be slightly below the 1992 average.

U.S. poultry meat production continues to trend upward, but the rate of growth will slow in 1993. Broiler producers will expand output over 6 percent in 1992 and broiler prices will average slightly over the 52 cents per pound. Prices in 1993 are expected to average near the 1992 level. Relatively strong broiler prices, combined with lower feed costs, have resulted in continued positive producer returns in 1992. With large grain and soybean crops, feed costs are expected to remain down in 1993 and help continue the positive returns. Broiler production is expected to increase 3-4 percent in 1993.

Turkey production will increase about 4 percent this year as producers faced another year of poor returns. Cold storage stocks of turkeys grew to record high levels this year. Turkey supplies for the late 1992 holidays will be record large and prices under strong downward pressure from these and large competing meat supplies. Hen turkey prices in 1992 are expected to average almost 60 cents per pound, down about 2 cents from the 1991 average. With the squeeze on producer returns, production in 1992 likely will expand only around 2 percent and prices are expected to average 57-63 cents per pound.

Egg production will increase about 2 percent in 1992 and be little changed in 1993. Egg producers had favorable returns from 1989 through 1991 but they have been squeezed this year. Egg prices declined this year as production rose and the Grade A large egg price will average around 65 cents per dozen, about 12 cents below the 1991 average. Prices are expected to increase in 1993 as production holds near the 1992 level.

Dairy

Milk production during 1991/92 was up about 1 1/2 percent from 1990/91. Sharpest gains in production occurred in the summer quarter when output per cow was about 5 percent higher than a year earlier. Unseasonably cool summer weather in some of the major milk producing areas helped boost output per cow to these high levels. The number of milk cows continued to decline and for all of 1991/92 averaged 1.8 percent below the year-earlier level. The cow herd is expected to decline again in 1992/93 but, gains in output per cow will be more than offsetting and milk production will rise slightly.

Commercial use during 1991/92 was up almost 2 percent from a year earlier. The modest recovery in the general economy has helped boost commercial use from the weak levels of 1990/91. In 1992/93, use is expected to continue to rise and be about 2 percent above the 1991/92 level.

CCC net removals under the price support program in 1991/92 totaled about 10.3 billion pounds, milk equivalent, milkfat basis, little changed from the 1990/91 level. Net removals are expected to decline in 1992/93 as commercial use gains and milk production changes only slightly.

The all milk price increased in 1991/92 and averaged \$13.26 per cwt. Prices have weakened in the fall and likely will drop below the year-earlier level. Prices likely will remain lower throughout 1992/93 and average \$12.05 to \$13.05 per cwt.

U.S. AGRICULTURAL EXPORTS

Fiscal 1993 agricultural exports are forecast at \$41.5 billion, slightly below the 1992 level of \$42.3 billion but the third highest ever -- the record is \$43.8 billion in 1981. The value of bulk commodities is likely to decline, mainly because of lower prices for feed grains and oilseeds. Cotton exports will be down. However, exports of high-value products will rise, especially livestock and horticultural products, helped by growing world demand, falling trade barriers and mostly plentiful U.S. supplies.

Forecast at \$24 billion, agricultural imports will decline slightly in fiscal 1993. Tobacco imports will be down but most products will be stable to slightly higher. Cocoa and coffee are likely to show modest gains in prices and imports, while sugar imports could slip. Imports of animal and horticultural products may increase as U.S. consumer demand picks up.

With slightly lower exports and imports, the trade surplus will slip one-half billion dollars to \$17.5 billion for fiscal 1993.

Japan will continue to be our leading market for agricultural exports in fiscal 1993. The EC and Canada are leading markets and Mexico is firmly in fourth position. Exports to Mexico are projected at a record \$4.1 billion, an increase of \$0.4 billion from 1992 and \$1.4 billion above 1991.

U.S. FARM INCOME AND FOOD PRICES

U.S. farmers are likely to see their cash incomes increase slightly in 1993 as cash receipts remain relatively large, Government payments increase and production expenses move up modestly. Consumers again will find record meat supplies and slow inflation, pointing to a moderate food price rise.

Farm Income

In 1992, net cash farm income is expected to total about \$60 billion, 4 percent above the \$58 billion of 1991. Cash crop receipts will be the highest ever, while expenses will decline because of lower expenditures for farm-origin inputs, as well as for interest and manufactured inputs, such as fertilizer. Net farm income is likely to reach almost \$51 billion, nearly matching the record \$51 billion of 1990 and well above last year's initial forecast of \$40 to \$46 billion. Farm output greatly exceeded expectations and production expenses were lower than anticipated a year ago. Also, an increase of around \$4 billion in the value of commodity inventories, reflecting the accumulation of crop stocks, is adding to 1992 income.

The 1993 outlook is for net cash farm income to total \$58 to \$64 billion, compared with the \$60 billion estimated for 1992. Marketing receipts will remain large, while gross cash income will be boosted by larger Government payments. Production expenses likely will be up only 1 to 2 percent from \$124 billion estimated for 1992. Expenses will be dampened by relatively large supplies of several inputs, especially feed, and a little less acreage planted to major crops.

Net farm income in 1993 is forecast at \$42 to \$48 billion, below the near-record \$51 billion estimated for 1992. In contrast to the value of inventory adding nearly \$4 billion to income in 1992, as crop stocks increase, a drawdown in 1993 will mean a reduction of around \$3 billion in the inventory value change.

The balance sheet for the farm sector in 1993 points to increases in assets, debts and equity. The debt-to-asset ratio is likely to remain at the reduced level in recent years of around 16 1/2 percent.

Food Prices

Retail food prices are estimated to increase slightly over 1 percent in 1992, well below the 2.9 percent increase in 1991. The easing in food prices in 1992 reflects increased supplies of meat and a slowing of inflation in the economy.

In 1993, a moderate food price rise of 2 to 4 percent is in prospect. The food price increase will again be slowed by record meat supplies, especially pork. Most of the increase in food prices will be from higher marketing costs, the major component of food prices. But the increase in marketing costs will be moderate if inflation remains at the 1992 level of around 3 percent.

OUTLOOK FOR 1993 AND BEYOND

1993 Crop Outlook

U.S. crop production is up 9 percent in 1992, as favorable weather resulted in recovery to record or near-record yields for many crops. Acreage planted to major crops was up about 2 percent. Acreage taken out of production under Government annual and long-term programs fell to around 54 1/2 million acres, down from 65 million in 1991. Acreage increased the most for wheat, corn and sorghum, where acreage reduction requirements were lowered and prices were attractive at planting time.

For 1993, crop acreage is likely to show a slight reduction, as producers respond to lower feed grain and soybean prices next spring and to increased acreage reduction requirements for corn.

However, acreage will likely increase for wheat due to a zero acreage reduction requirement.

U.S. crop yields are well above trend this year for several crops. Many crops suffered stress or actual losses from excess moisture, dryness and freeze; but overall conditions turned out to be excellent for yields. Among the crops forecast to achieve record high yields are corn, soybeans, durum and other spring wheat, sorghum, oats, barley and potatoes.

If yields drop back to trend levels in 1993, they will be down for wheat, corn, soybeans and cotton. A combination of these lower yields and/or reduced acreage would suggest smaller crops, next year, except for cotton where the very high abandonment of cotton acreage is not expected in Texas.

Demand for 1993 U.S. crops is likely to expand in response to further economic recovery around the world and continued large livestock feed requirements and population growth. U.S. stocks of corn and soybeans are likely to be reduced in 1993/94, while wheat and cotton are likely to move up.

International Markets For U.S Agricultural Products

Later in the 1990's, world commodity consumption and trade are expected to respond to an easing of trade barriers and stronger economic growth. U.S. agricultural exports stand to gain, since U.S. producers and marketers are competitive in world markets.

Trends in U.S. agricultural exports over the past two decades offer some insight into prospects for the future. The 1970's were a period of rapid and unsustainable growth in U.S. agricultural exports. Total U.S. agricultural exports rose at an annual rate of \$1.4 billion, led by \$0.8 billion annual increases to industrial countries.

However, in the 1980's, U.S. exports stagnated to all broad economic groupings -- industrial, less developed and formerly centrally planned. Significant increases can be found only by looking at smaller groupings, such as within the less developed countries, where U.S. exports continued to grow to East Asia (Hong Kong, Singapore, South Korea and Taiwan).

In the 1980's, among the industrialized countries, Europe increasingly turned to subsidizing their own agricultural production, reducing not only their need for imports from the United States but exporting their surpluses into world markets and displacing exports of the United States and other countries.

The less developed countries, particularly in Latin America, were hard hit by the recession in industrialized countries in the early 1980's. As their economies turned down, they could not afford imports. Only now is this situation turning around.

Countries formerly having centrally-planned economies also were lacking in financial resources to buy in world markets during the 1980's, particularly Eastern Europe.

What do the developments of the 1980's suggest for the 1990's and beyond?

There are two developments in the 1980's that may shed some light on U.S. export prospects in the years ahead: There were expanded shipments to East Asia, particularly the newly-industrialized countries (NIC's), where economic growth was strong and imports rose; and there was an expansion in U.S. exports of some high-value products, particularly for those commodities where production and trade were much less subsidized than was the case for bulk commodities.

First, U.S. exports to NIC's rose \$140 million per year in the 1980's, spurred by annual rises in economic growth of about 8 1/2 percent per year. It is very likely there will be new "NIC's" in the 1990's as economic growth responds to recent trends in the reform of agricultural production programs and toward the elimination of trade and capital market restrictions. Latin American countries, particularly Mexico, appear to be good possibilities for becoming NIC's and to be growing markets for U.S. exports.

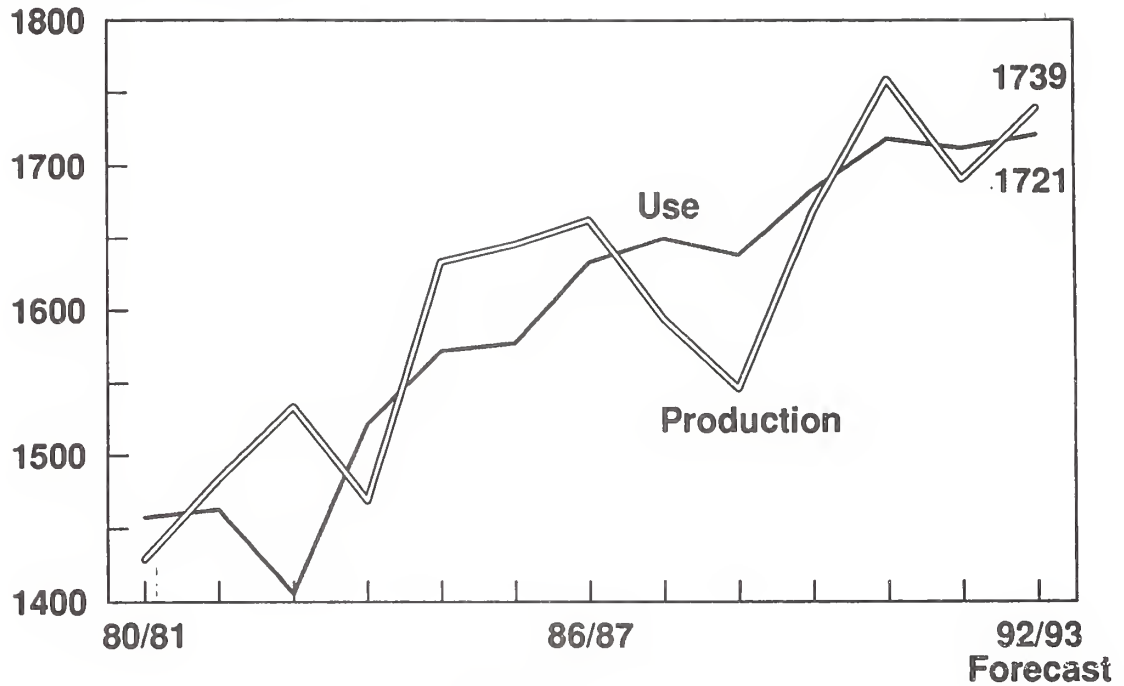
Second, U.S. exports of high-value products rose \$570 million per year in the 1980's while bulk products dropped \$930 million annually. U.S. exports of some high-value products, particularly horticultural products, benefitted from a wholesale removal of restrictions in the 1980's. This growth is likely to continue in the 1990's, particularly as trade restrictions are lifted in additional countries and for other high-value products, such as animal products.

This also suggests that U.S. exports of bulk products would benefit under reduced production subsidies and fewer trade restrictions.

In summary, the 1990's should be a period of relatively strong growth in U.S. agricultural exports. Expanding U.S. exports would be in response to economic recovery around the world, particularly in less developed countries, and reform in farm and trade policies.

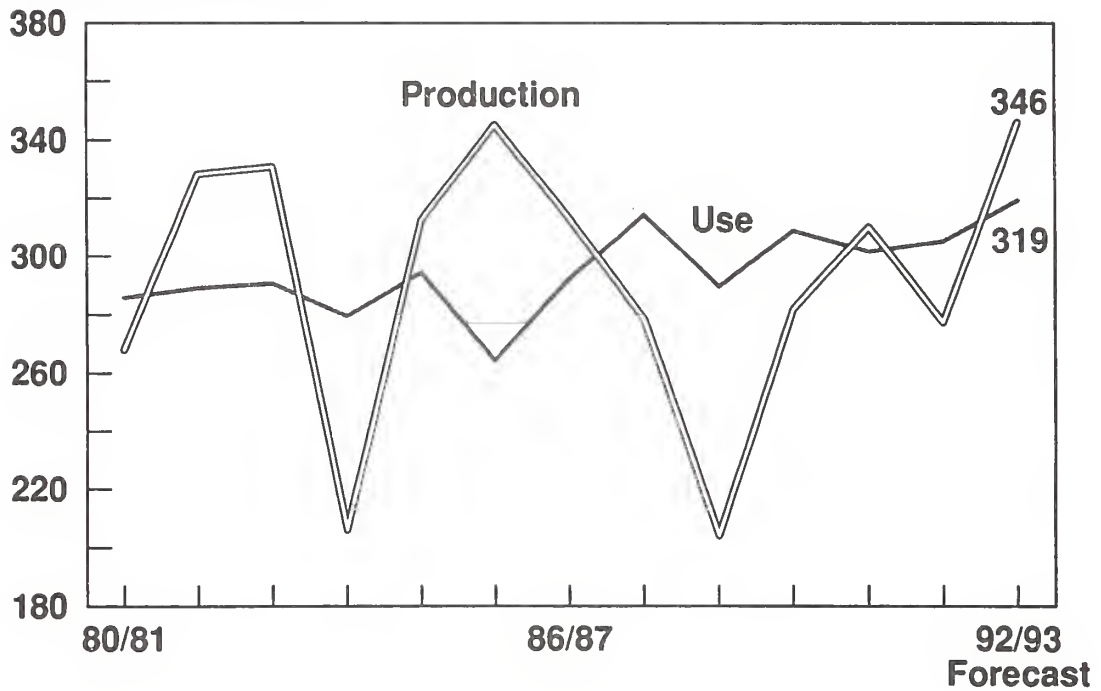
World Grains

Million Metric Tons



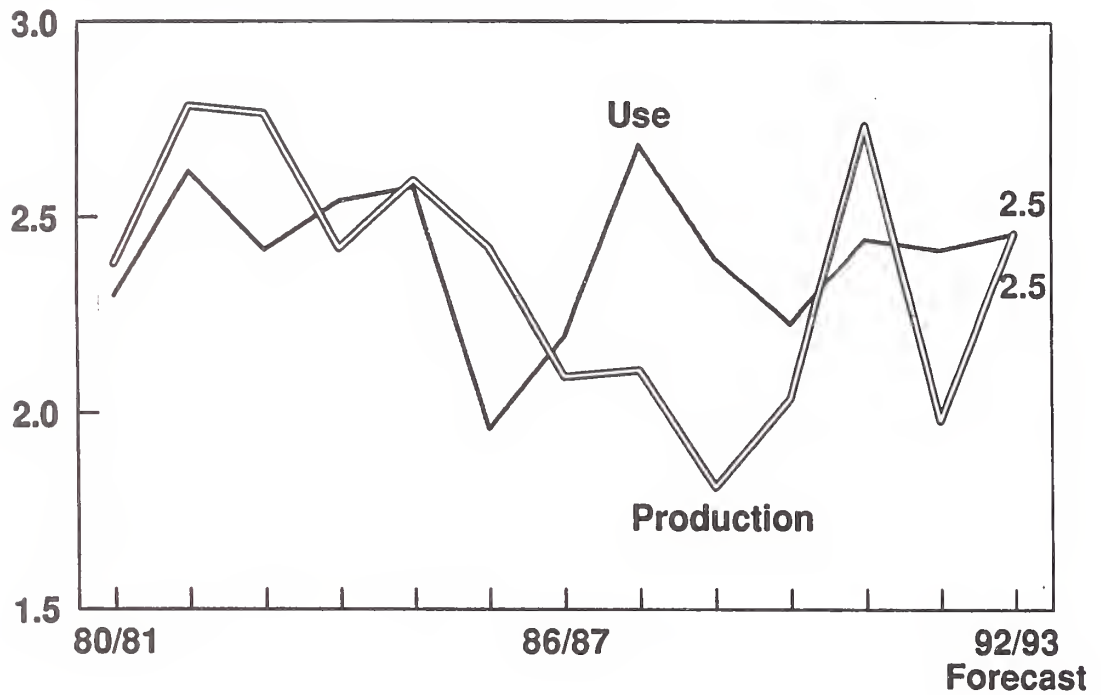
U.S. Grains

Million Metric Tons



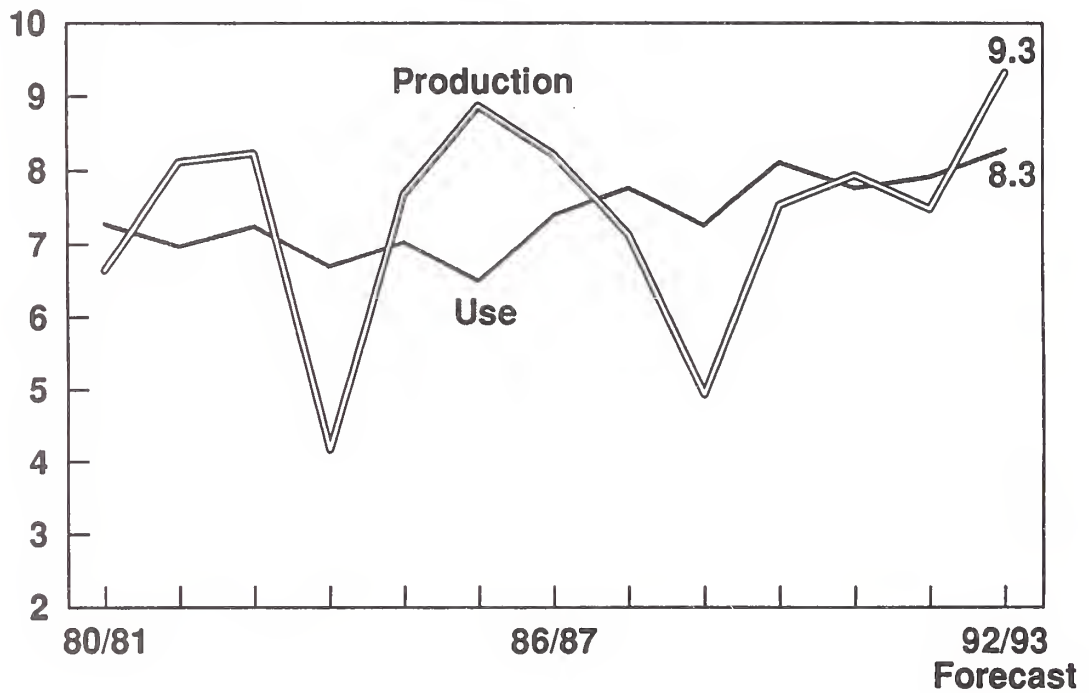
U.S. Wheat

Billion Bushels



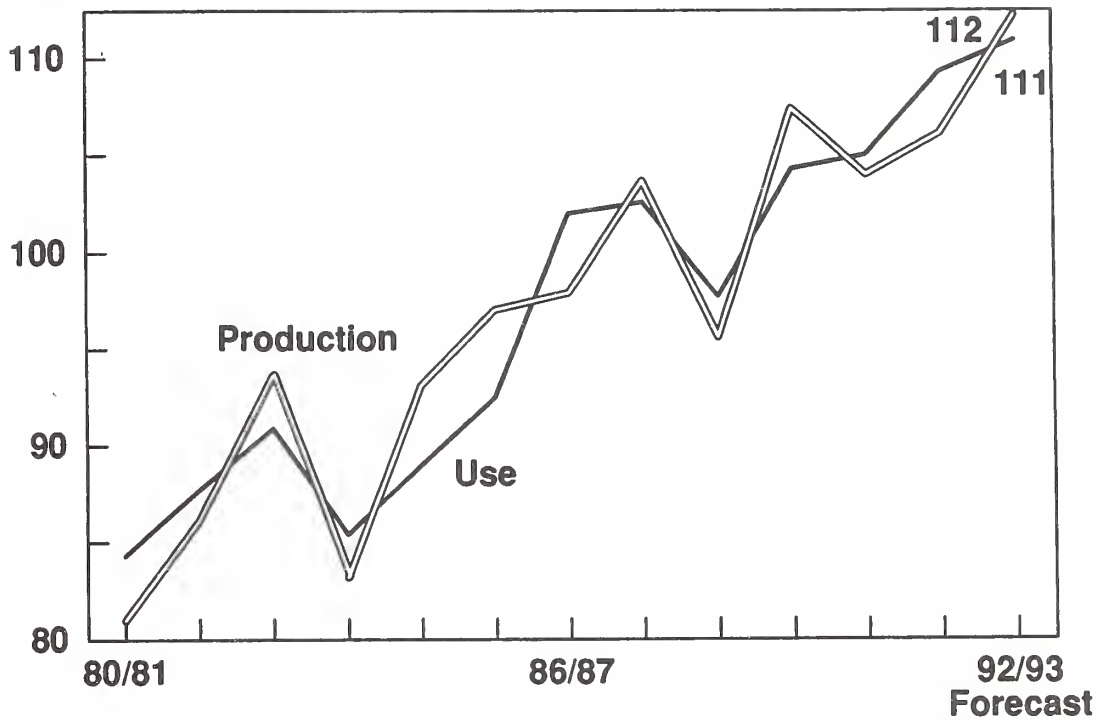
U.S. Corn

Billion Bushels



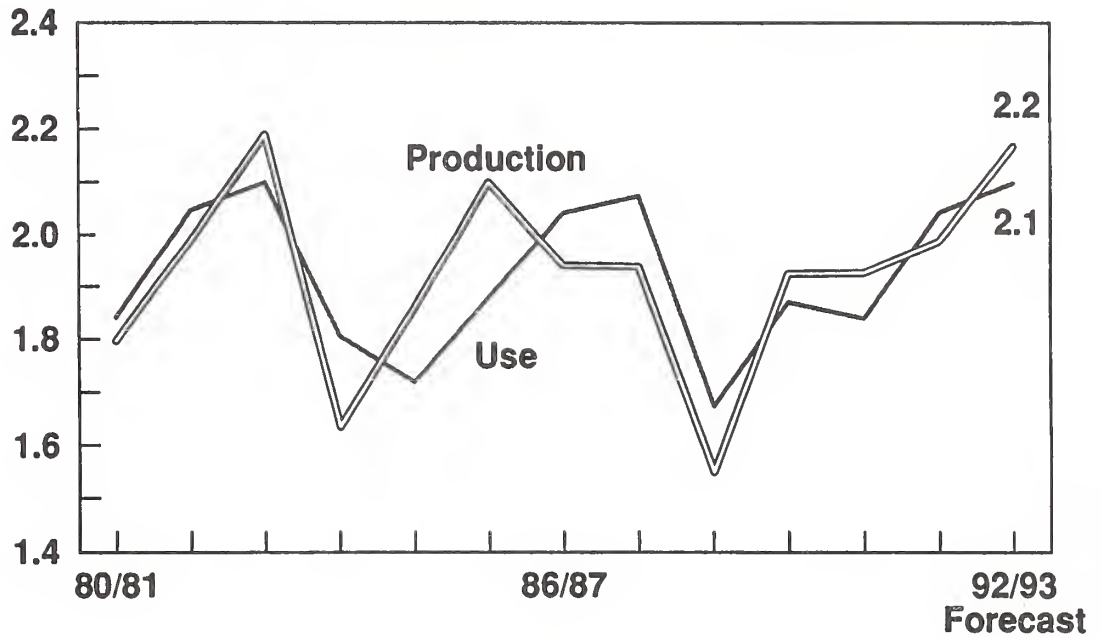
World Soybeans

Million Metric Tons



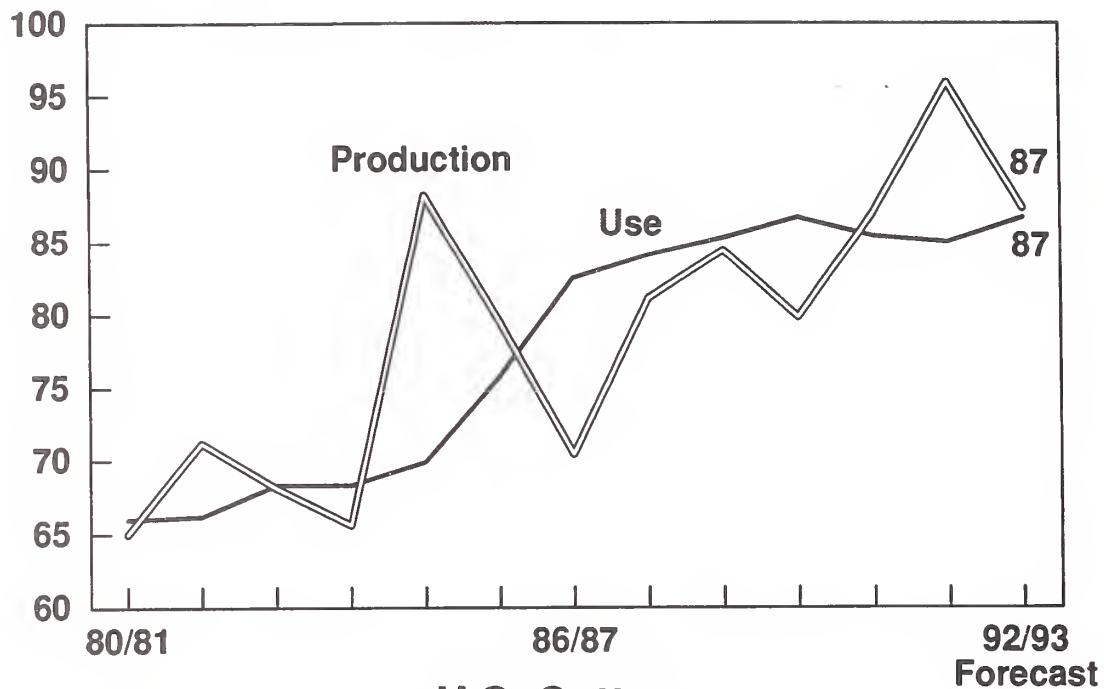
U.S. Soybeans

Billion Bushels



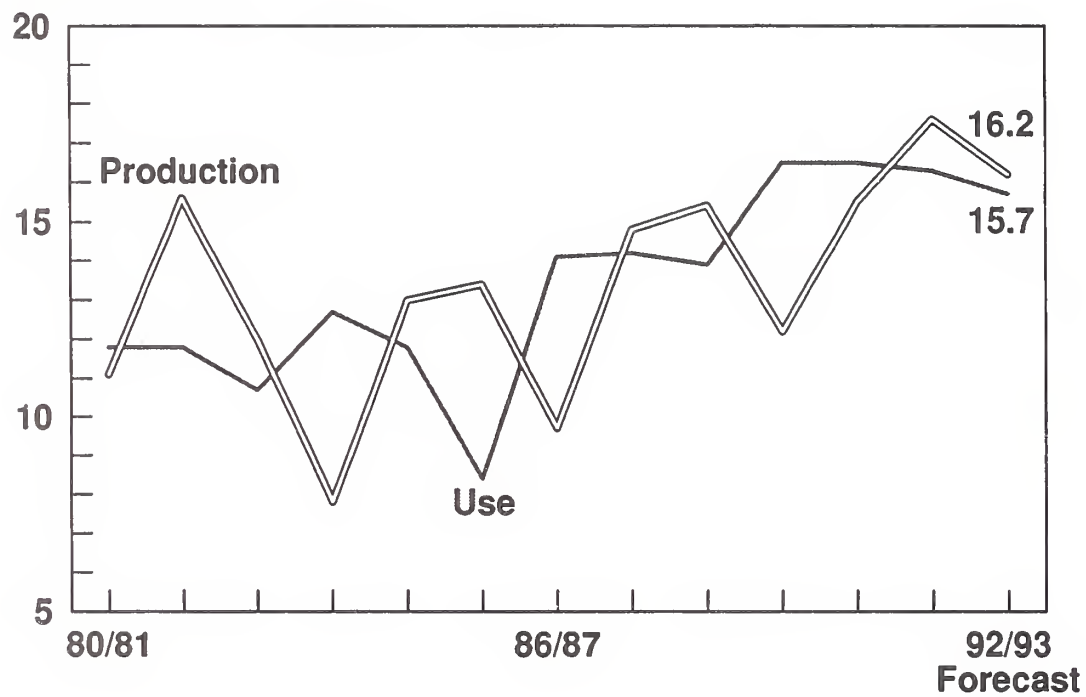
World Cotton

Million Bales



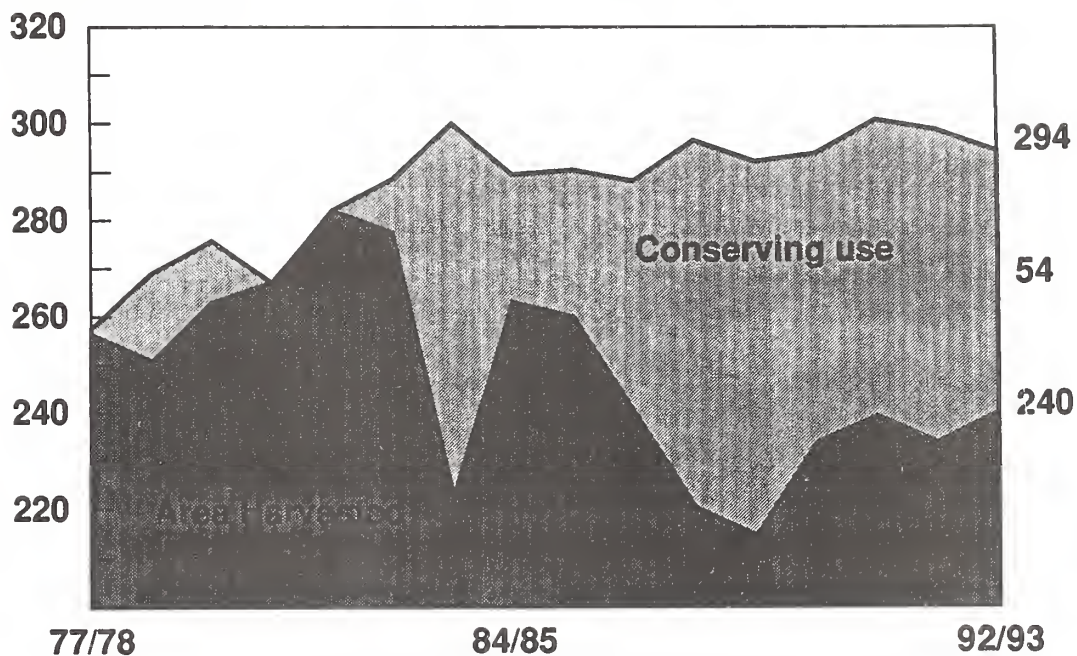
U.S. Cotton

Million Bales



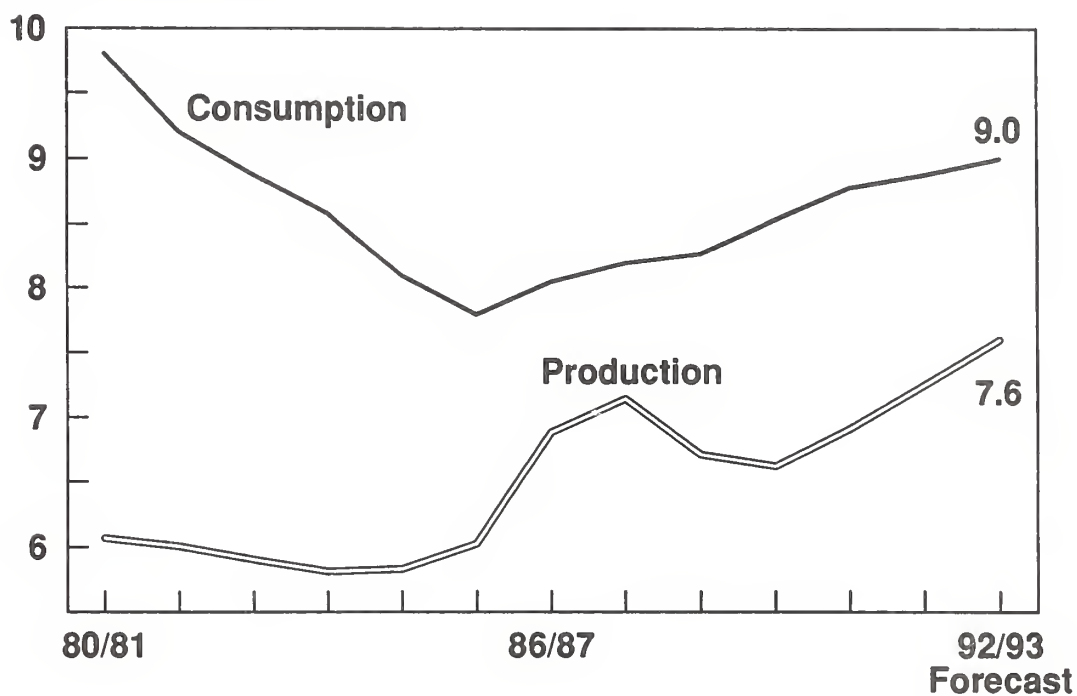
Crop Area Harvested Plus Conserving Uses

Million Acres



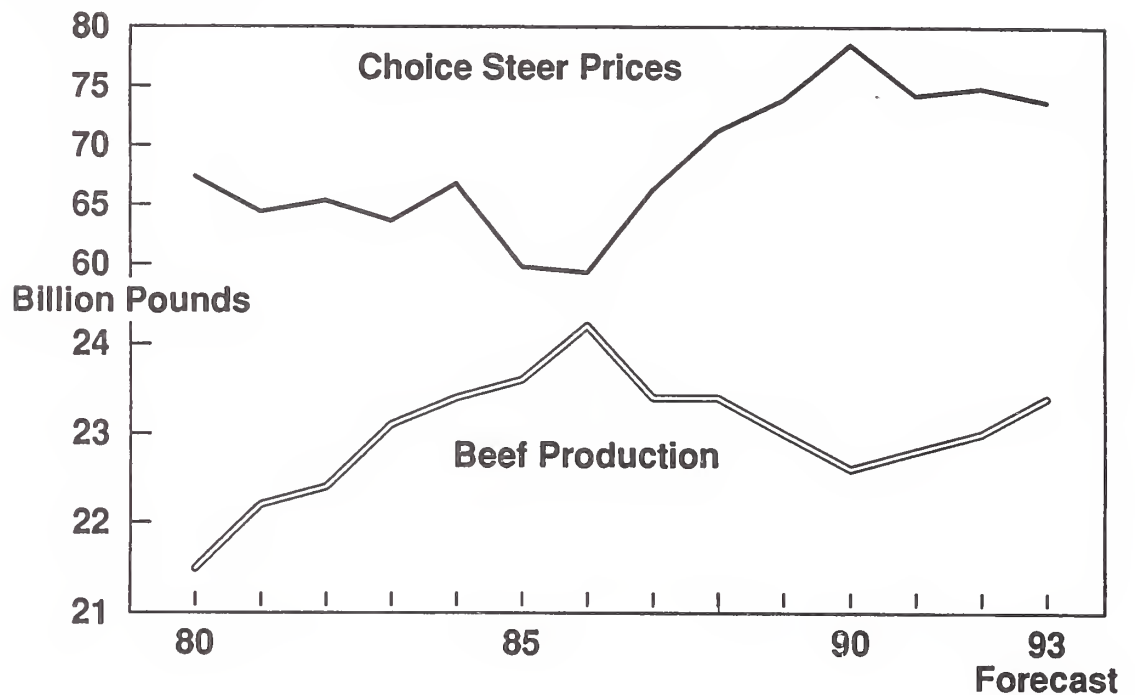
U.S. Sugar

Million Short tons



Beef Production and Steer Prices

Dollars per cwt



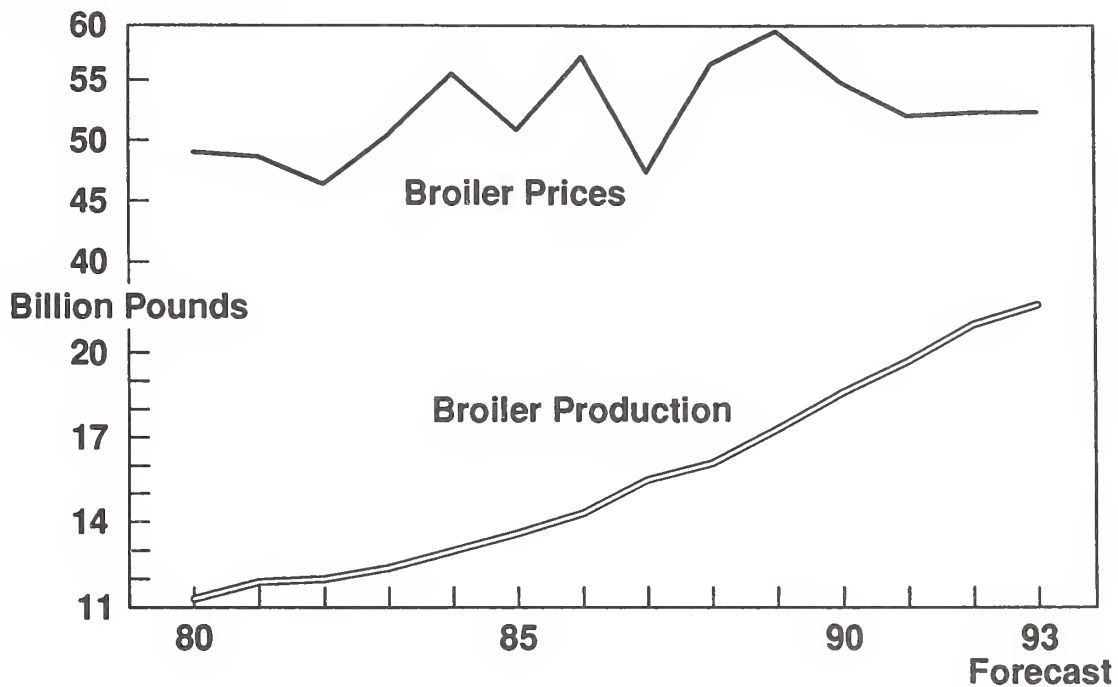
Pork Production and Prices

Dollars per cwt



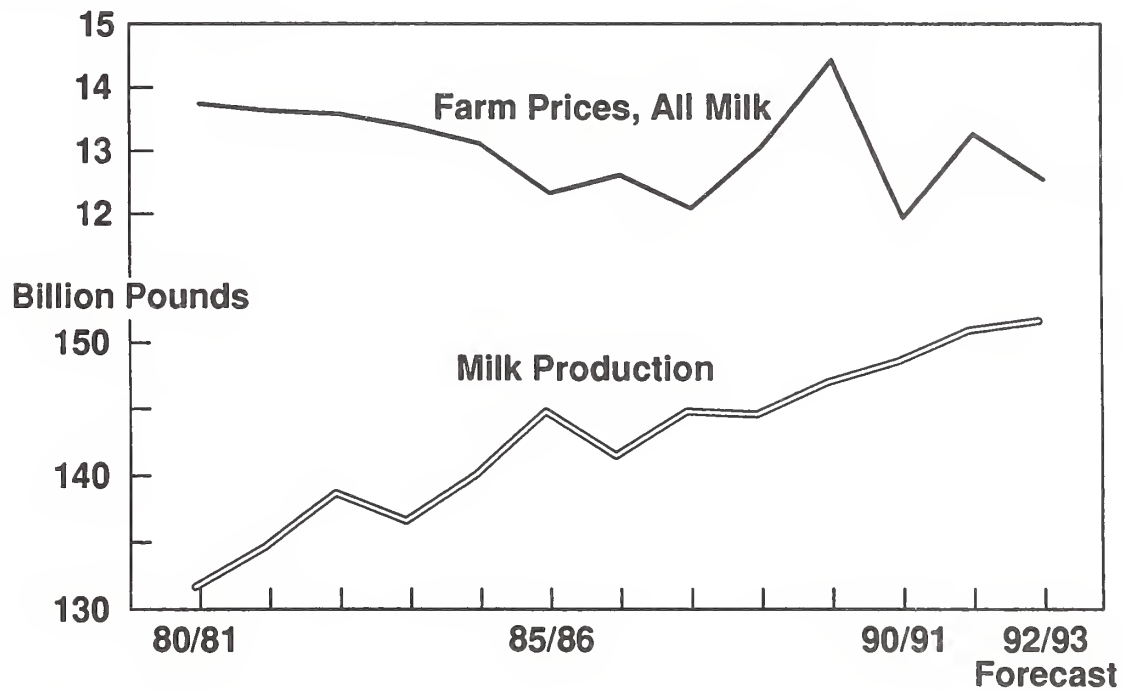
Broiler Production and Prices

Cents per Pound



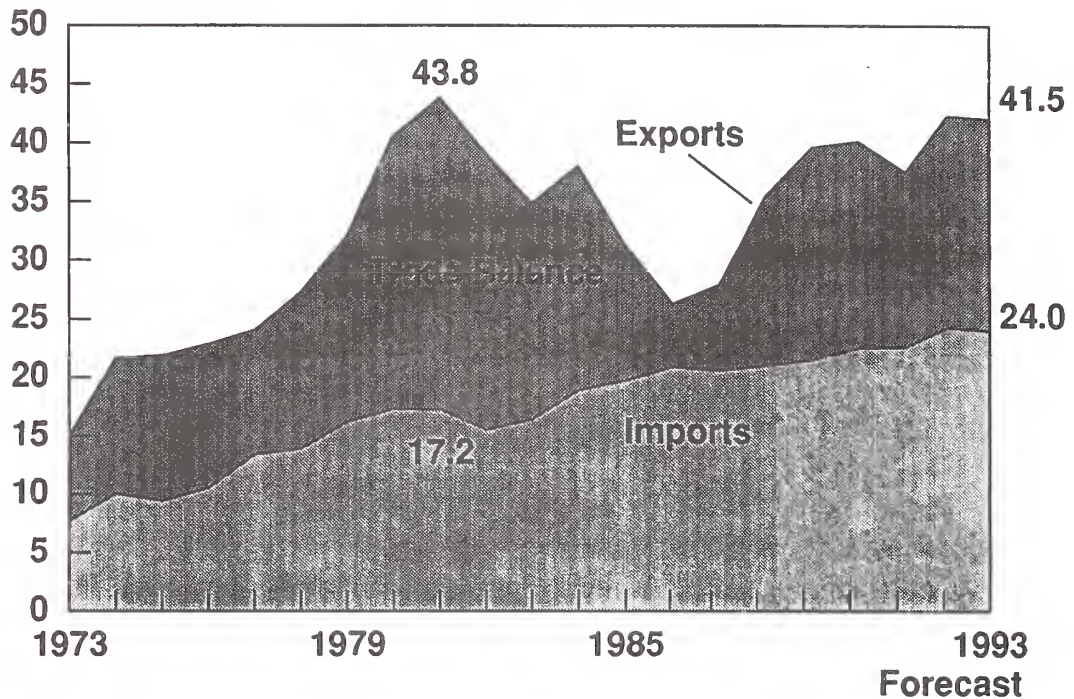
Milk Production and Prices

Dollars per cwt

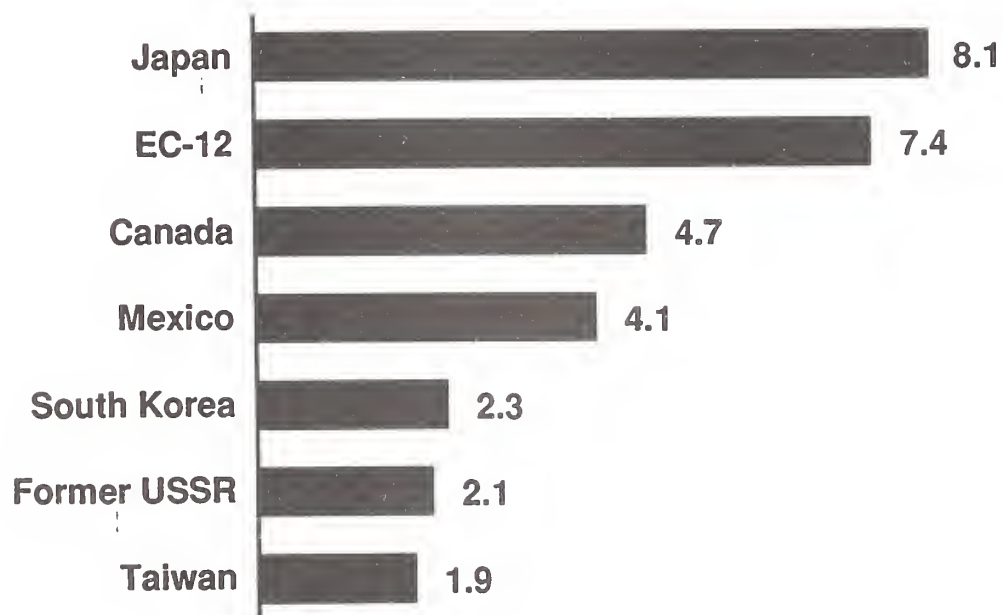


U.S. Agricultural Trade Fiscal years

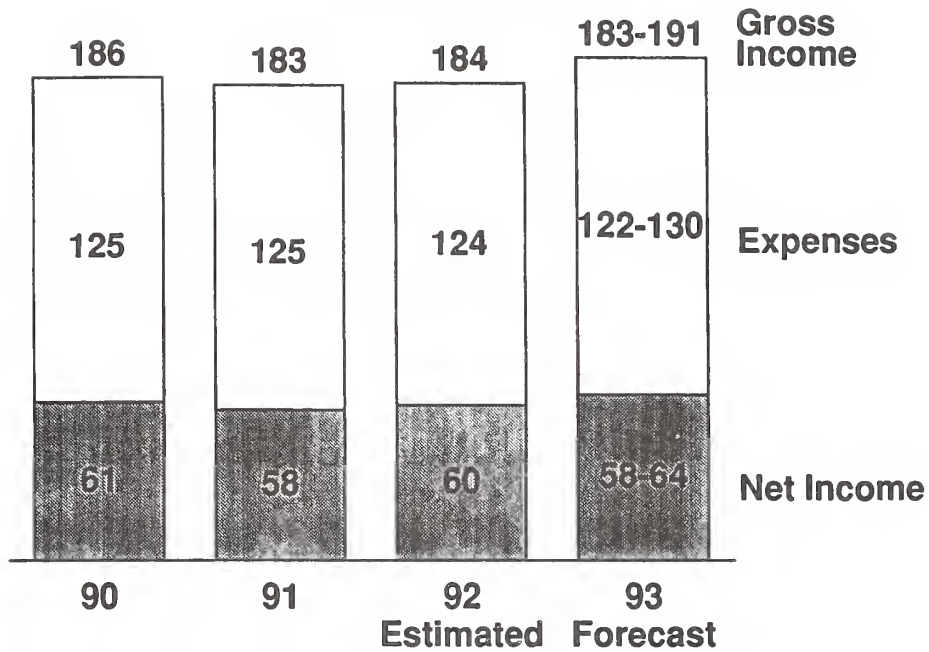
Billion Dollars



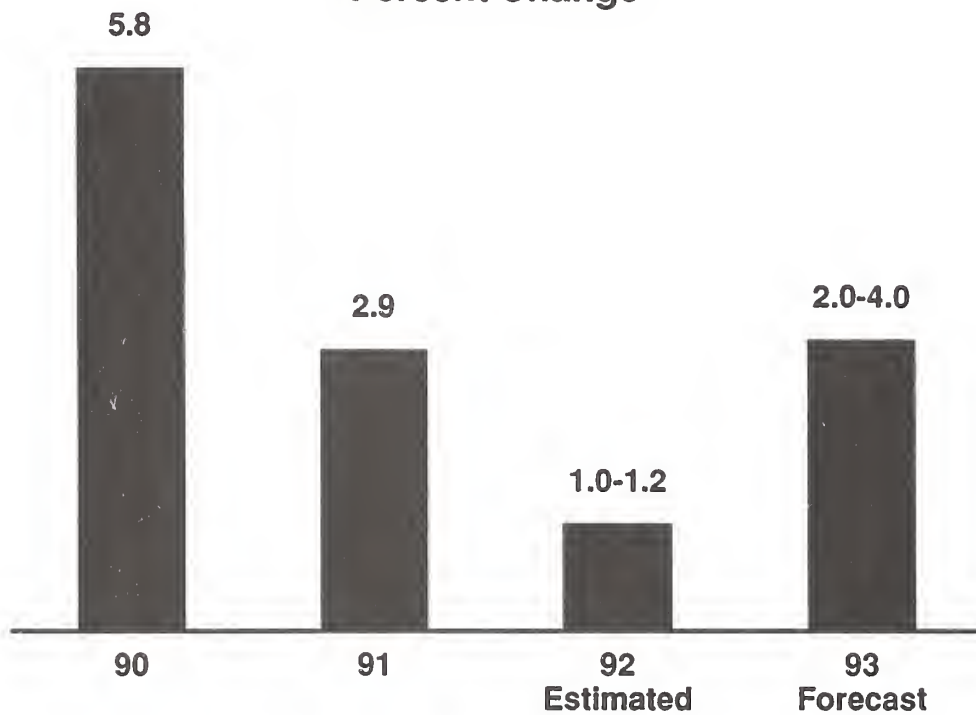
Top U.S. Agricultural Markets Billion Dollars, Fiscal 1993 Forecast



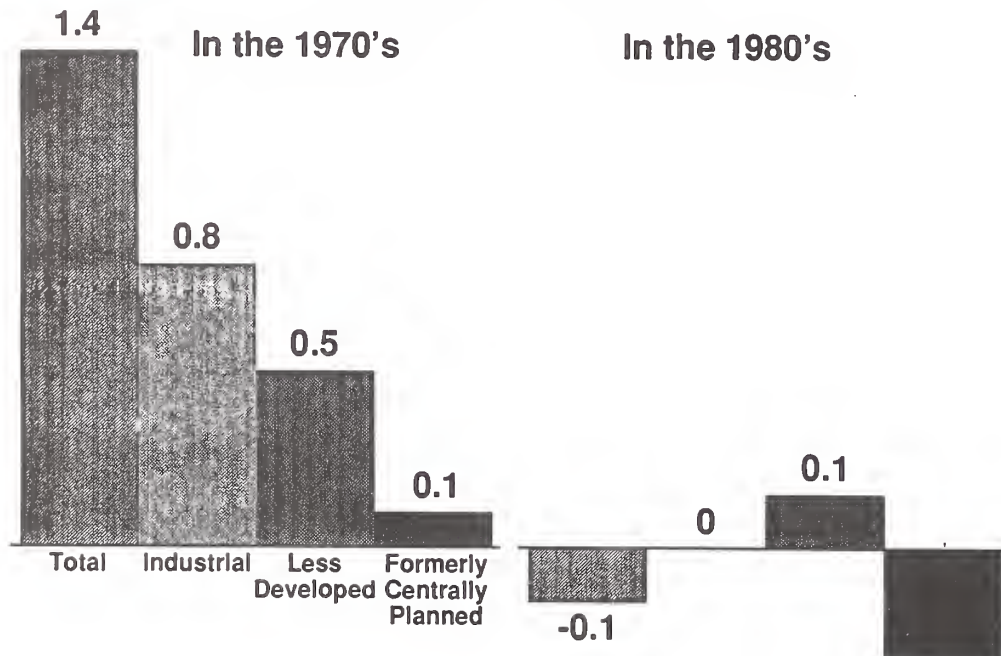
Cash Farm Income Billion Dollars



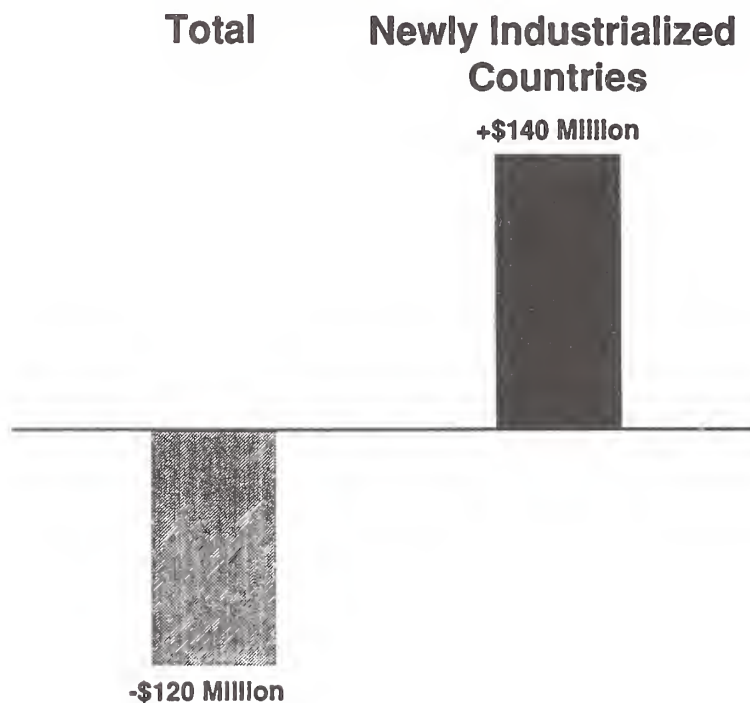
Food Prices Percent Change



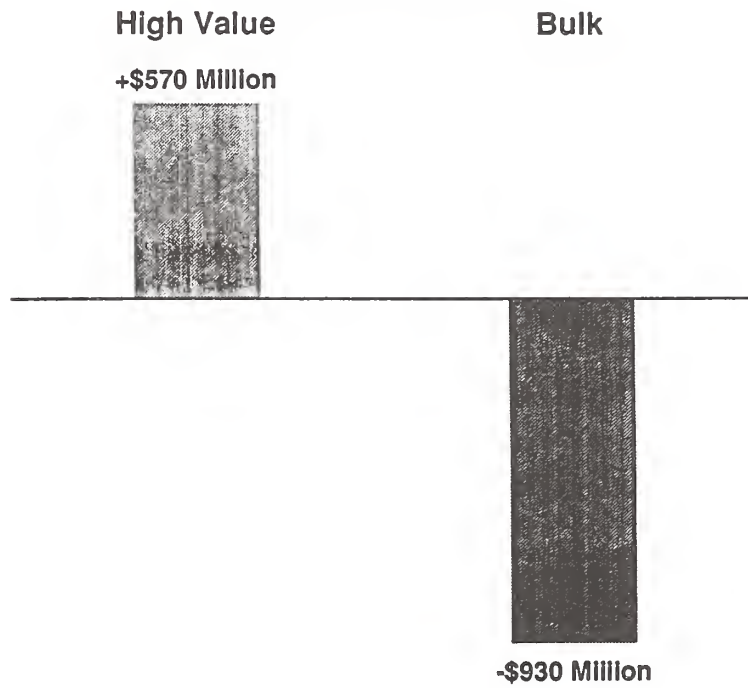
Annual Change in U.S. Agricultural Exports By Region, Billion Dollars



Annual Change in U.S. Agricultural Exports in the 1980's



Annual Change in U.S. Agricultural Exports in the 1980's



Outlook '93

For Release: Tuesday, December 1, 1992

**OPENING REMARKS: PROSPERING
IN A CHANGING WORLD MARKETPLACE**

Ann M. Veneman
Deputy Secretary of Agriculture

It's a pleasure to be here today and to serve as moderator of this panel. The theme of this session is "Prospering in a Changing World Marketplace." The future success and prosperity of American agriculture and of our nation are linked to the global marketplace.

Today, political and economic changes of unprecedented magnitude are whirling about the globe and opening up the world to trade and commerce as never before. In countries like the former Soviet Union and Eastern Europe--countries that once resisted change of any kind and seemed incapable of the slightest positive reform just a few years ago--democracy has taken firm root. Once the people suffered the will of the ruthless state in silence and their future was more a matter of fate than a matter of choice. Now, they have a voice in their government and a hand in shaping their destiny under democracy. Their demands for freedom and liberty are not only being heard; they're being met. Their call for political freedom has resounded equally strongly for economic freedom.

Now the spirit of free enterprise is on the move. Entrepreneurial capitalism is taking hold. And men and women are eagerly embracing business as a practical way to reach their dreams. The roadblocks to free enterprise are being cleared away, and new reforms now are favoring those whose vision, hard work, and determination will carry them as far as they can go.

Elsewhere throughout the world, political and economic reforms--sometimes on a grand, more widespread scale but more often on a smaller, more gradual scale--are giving hope to millions. Failed political systems are being scrapped as new ones are being installed. And the old economic system that served a few and shut out the many is being reformed to serve all equally. The nations of the world have entered into a new era of economic relations. Today, more nations recognize that they stand to gain much from economic cooperation, particularly through trade.

And there is a growing recognition on their part that international trade is a key to strong economic growth at home.

All nations have a stake in the world economy and want to share in the benefits it offers. That is why we have seen such a strong interest in the GATT talks and in the creation of regional trade blocs such as the North American Free Trade Agreement.

The results and the rewards of all these changes--political and economic--are remarkable. They are most apparent in rising incomes, expanding living standards, and economic growth that ensure a more prosperous life. And the political and economic changes we are witnessing are forming vast new markets and creating unlimited opportunities for American producers.

Today, if we want to prosper here at home, we must succeed abroad through international trade. The opportunities to do so could not be more plentiful or lucrative than they are now and promise to be in the future. We all can and will prosper in this changing world marketplace.

Today, after these opening remarks and my address entitled "The Emerging Framework for International Trade," we will be privileged to hear from two other speakers who will discuss the importance of the global marketplace to American agriculture. First, we will hear from Congressman Charles W. Stenholm. Mr. Stenholm represents the 17th District of Texas in the U.S. House of Representatives and holds a leadership position on the House Agriculture Committee. His topic is: "Agricultural Trade in a New International Marketplace."

Our concluding speaker will be Mr. Robbin S. Johnson, who is Vice President of Public Affairs at Cargill Incorporated, the world's largest, privately-held agribusiness. Mr. Johnson's topic is: "Agribusiness in a New World Economy."

I am pleased to have them join me in this panel, and I look forward to their comments. I am confident we will all benefit from their views and insights.

Thank you.

Outlook '93

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EMERGING FRAMEWORK FOR INTERNATIONAL TRADE

Ann M. Veneman
Deputy Secretary of Agriculture

I am pleased to participate in this year's outlook conference which has the theme "Agriculture's Changing Horizon." This session is titled "Prospering in a Changing World Marketplace." You will note that "change" is the key focus. (With "change" for a theme, I must ask what did the organizers of this conference know and when did they know it?) Change, of course, has been common to agriculture, but there are unprecedented events unfolding that will determine what business we will do and how we will do it in the global marketplace.

At least one thing stays constant in agriculture: exports are vital to U.S. agriculture and the economy. We export about 16 percent of our total agricultural production and export the production of about 1 of every 3 acres of harvested cropland. And the economic benefits from more agricultural exports spread throughout the economy as our economic resources are more fully utilized. I cannot comprehend how U.S. agriculture will prosper unless we move into the 21st century with a goal of becoming more competitive in the global marketplace. Enhancing U.S. agricultural export performance in a changing world marketplace is the paramount challenge to all of us in U.S. agriculture.

My objective today is initiate this session by discussing the emerging framework for international trade. My remarks focus on what I believe are four principal factors that will shape the international trade environment for the coming years: (1) global economic interdependence; (2) changing markets; (3) trade agreements; and (4) market access.

Global Economic Interdependence

Recent disruptions in the European currency exchange market and the slow economic growth of the world's developed countries, remind us how interdependent the world's economies have become. The economic fortunes of the United States and other nations are interlinked and these linkages are strongest in export dependent sectors such as agriculture. With increased interdependence, each

nation has much less autonomy in managing its economy than in the past. The effects of domestic economic policy transcend national borders. Globalization of the U.S. economy is a force that is pushing uncompetitive industries toward greater competitiveness or likely elimination. Inefficient U.S. industries that do not adjust, whether sustained now through protectionism or a lack of efficient foreign competitors, will not succeed for a couple of reasons. First, protectionism worldwide is on the retreat. Trade barriers will not much longer provide a refuge for those who fail to innovate. Some examples of the trend toward more open markets are our trade agreements initially with Canada and more recently, the North American Free Trade Agreement (NAFTA); Europe's economic integration; the Closer Economic Relations Agreement between New Zealand and Australia; and the Pacific nations' movement toward the Asia-Pacific Economic Cooperation Council. Ultimately, all active nations will follow the trend to overcoming Protectionism.

A second factor is that many developing countries are now expanding the skills of their labor forces and achieving strong rates of economic growth. These countries are generating and attracting investment capital that will create the efficient industries that displace the inefficient ones around the globe. America has tasted that trend during the past decade when layoffs in a number of manufacturing industries became permanent job losses. This has lowered production costs and made the U.S. industries more competitive. The restructuring of U.S. manufacturing has followed the emergence of these higher skilled, rapidly growing economies elsewhere in the world. While the developed countries grew slowly in the early 1990's, the developing countries grew more than 3 times faster. The growth disparity will continue in the 1990's. U.S. agriculture must provide food and agricultural products competitively, if it is to supply the markets in these emerging growth countries.

The lesson for U.S. agriculture is clear. We must exploit our comparative advantage. We must invest more in the development of technology; farmers must innovate the new technologies quickly and efficiently; farmers' production, management and marketing skills must be increased; and government must pursue domestic and trade policies that do not undermine the long-run efficiency gains that come from technology improvement. Price and trade insulation policies and acreage diversions are the most worrisome threats. This means that trade competitiveness must be at the top of the list of objectives when domestic storage policies, acreage reduction policies, and trade policies are made.

While continuously equipping to deal with global competition, we must recognize that government-induced economic forces can limit trade opportunities for even the most innovative and competitive firms. Global economic growth, inflation, interest rates, and exchange rates directly bear on foreign demand for U.S.

products. The United States must assist other nations in facing the challenge of developing economic policies that enhance the growth of employment and productivity and improve their trade opportunities.

Within the United States, income and population growth are estimated to have increased the domestic demand for food by less than 1.3 percent per year during the last decade. Faster demand expansion for U.S. food and agricultural products requires export growth. We must also maintain the focus on research to expand new uses for agricultural commodities. The U.S. agricultural industry will operate in a world where the population will double in the next 30 years. Some 95 percent of the growth will be outside of the United States. With strong economic growth, there is a potential for substantial growth in foreign demand for food. Policies that foster production efficiency at home and trade worldwide are the prescription for sparking and benefitting from that explosion.

Changing Markets

As incomes grow, the demand for higher-valued products increases. In the United States, real expenditures on food have been rising faster than the quantity of food consumed, driven by demand for specific qualities in food, convenience foods, and food service. As global incomes grow and diets are upgraded around the world, higher-value and processed food demand will rise. Last year, U.S. exports of higher-value products exceeded exports of bulk products for the first time since World War II. Much of the world's population growth will occur in the developing countries and they will offer expanding market opportunities as their incomes grow. For many of them, however, the challenge is to achieve sustainable economic growth and reduce poverty.

The significance of changing markets is vividly demonstrated by recent events. Eastern Europe countries and the newly-created 15 independent states of the Former Soviet Union (FSU) are now engaged in the immense task of creating new societies and institutions and integrating themselves into the global economic system. These events have created a large number of new national borders across which trade must occur. The economic change underway in these transition countries will change the international trading environment. The movement away from failed centralized to market economies holds the promise for a significant expansion in world trade as economies grow. Failure in this transition would lower world trade and economic growth, set back progress toward democratic and market reform in other countries inspired by the East Europe and FSU experience, and create misery for hundreds of millions of people.

Trading Agreements

As we move toward the 21st century, it is evident that most countries want to expand trade to benefit their economies by creating market access, reducing trade barriers, and establishing rules and disciplines governing trade. This is happening on a multilateral basis in the General Agreement on Tariffs and Trade (GATT) and in regional free trade areas.

The GATT was established in 1947 and its 100+ members now account for over 80 percent of world trade. Another 20 or so countries abide by GATT rules. The GATT establishes rules for governing trade and is an international forum for resolving trade disputes. Agricultural trade has generally not been brought under GATT disciplines, but GATT-sponsored negotiations have helped lower tariffs by more than 90 percent from the prohibitive levels of the Smoot-Hawley era. Unfortunately, self-sufficiency, high tariffs, import quotas, export subsidies, and bogus health barriers to trade abound in much of world agriculture.

The Uruguay Round, the 8th round of GATT-sponsored multilateral negotiations, is moving to closure to bring greater GATT disciplines to agricultural trade. The November 19 U.S.-EC agreement on Uruguay Round agricultural issues and oilseeds removed a major roadblock to the Uruguay Round. The agreement calls for a 21 percent cut in the quantity of subsidized exports over a 6-year period from a 1986-90 base, which like the Dunkel Text will result in a significant reduction in subsidized exports. The agreement reduces total trade-distorting support across commodities by 20 percent. Although there is no discipline on support for individual commodities as in the Dunkel Text, the agreement will impose unprecedented GATT discipline on internal support. During the next few weeks, a final Dunkel Text is expected that will reflect the U.S.-EC agreement.

When the Uruguay Round is successfully completed, there will be disciplines on market access barriers, trade-distorting internal support, export subsidies, and sanitary and phytosanitary regulations. Overall, a Uruguay Round agreement is expected to increase world economic growth by 1/2 percent per year and add more than \$100 billion annually to the global economy. A GATT agreement will be an important engine of economic growth into the 21st century. The forces of protectionism must not be allowed to block this opportunity. We have completed negotiation of the NAFTA which will phase out barriers to trade in goods and services in North America, eliminate barriers to investment, and strengthen the protection of intellectual property rights. The NAFTA will build on the U.S.-Canada Free Trade Agreement which became effective on January 1, 1989. As tariffs and other trade barriers are eliminated, the NAFTA will create a massive open market--over 360 million people and over \$6 trillion in annual output.

U.S. agricultural exports to Mexico have grown significantly since the mid-1980's, rising from \$1.4 billion to \$3 billion in 1991. NAFTA assures that this growth in U.S. exports will continue. Mexico's increasingly urbanized population is growing at 2 percent per year and is a significant market for U.S. agricultural products. Improved economic activity resulting from the agreement will boost income and stimulate demand for greater amounts and a greater diversity of food and feed products. By the end of the 15-year transition period, annual U.S. agricultural exports to Mexico will likely be \$2.0 billion higher under NAFTA.

Other countries are joined in regional trade agreements and the trend is likely to continue. The consequences of regional trade agreements for world trade, and U.S. agricultural trade will be positive if it is focused on market openings. That will require to United States to participate vigorously in opening markets wherever possible.

Market Access

We must have access to foreign markets if U.S. agriculture is going to fully utilize its productive capacity. Market access for U.S. agricultural products will be influenced by the factors I have discussed: global economic interdependence, economic and population growth, changing markets, and trade agreements.

U.S. agribusiness is challenged to develop products and marketing strategies to compete successfully in other markets. I believe we are meeting this challenge but firms must continue to improve their efforts to penetrate foreign markets.

The government is helping agricultural industries as they look to overseas markets. We are working to reduce trade barriers in the Uruguay Round and have done so under the NAFTA and the U.S.-Canada Free Trade Agreement. We can counter unfair trade practices as we are doing with the Export Enhancement Program. We can promote economic growth as we are doing with food assistance through P.L. 480. And the export credit guarantee and the market promotion programs are helping to develop overseas markets. We also are providing market intelligence and information to improve marketing efficiently.

There are limits, however, to the resources and ability of the government to expand U.S. agricultural exports. In the world marketplace, it is the ability of agribusiness to provide the products that foreign consumers want that is critical.

Concluding Remarks

I will conclude these remarks by emphasizing my view of the world marketplace of the future and our challenge to succeed in it:

- We approach the 21st century knowing that agriculture must export to prosper.
- With interlinked global economies, we must accelerate our technological development and efficiency in agriculture or be left behind more efficient competitors.
- We must work to achieve global macroeconomic policies that foster growth and avoid policy-created variability and uncertainty.
- A key economic growth policy is the promotion of trade through reduction of agricultural trade barriers worldwide.
- And we must recognize where our customers are and deliver the quality and services they want and need.

Investment in human capital and research in farm and food technology, the elimination of anticompetitive policies and regulations, and the promotion of democracy and market-based economic growth abroad is a framework for farm prosperity here at home. These challenges will require the best efforts of government and U.S. agriculture.

Outlook '93

For Release: Tuesday, December 1, 1992

**THE HONORABLE CHARLES W. STENHOLM
U.S. HOUSE OF REPRESENTATIVES**

* I have fond memories of very productive and encouraging meetings with Ann Veneman as she, Pat Roberts and I traveled the country this past year... talking with farmers and ranchers about how USDA and our current farm programs can work better.

* But in addition to just reviewing traditional farm programs, we have to begin looking seriously at the entire framework under which our nation's agricultural policy exists, and here's why.

* Overall, the agricultural industry is at a crossroads. Whether we're talking about our country's budget crisis and the financial stability of our domestic producers, the increasing demands of today's consumers, what role science and new technology will play, or our evolving international marketplace -- we face tremendous challenges.

- Recognizing that fact, we have to stop and ask ourselves from time to time if the path we're taking is based on any type of purpose or if we're just drifting?

* The time to refocus is now...the window of opportunity is open. Today's production system has served Americans well, but the priorities that were driving the system in the past are not necessarily the primary issues confronting producers and consumers today.

- The House Agriculture Committee will begin the 103rd Congress with this in mind by taking a serious look at long-term policy decisions -- both in anticipation of the 1995 Farm Bill and into the next decade.

OUR FEDERAL BUDGET AND FINANCIAL STABILITY OF AGRICULTURE

* One of the most important issues facing Congress is the federal deficit. Polls show the American public ranks it among the most important of their concerns as

* We can not borrow \$1 billion a day and expect to maintain any type of economic credibility, let alone competitive edge. At some point the chickens are gonna come home to roost.

* That makes farm programs extremely vulnerable. Simply their entitlement nature, coupled with their complexity and obscurity, put them at the top of the list when it comes to spending cuts.

* Support for traditional farm programs is shrinking as federal budget constraints tighten and political clout moves from rural districts to growing urban areas.

* But what former Secretary of Agriculture Earl Butz said at a recent meeting with ag bankers holds true: "Agriculture is the basis of our national strength... don't ever forget it."

* Today's farmer and rancher is doing a great job, and the American consumer of food and fiber is the beneficiary.

* Less than 1% of the federal budget goes into farm price support programs, yet 20% of the gross national product comes from agriculture. This is a success story that few government programs can match.

* But we have to be careful not to reach a point where it's no longer profitable for farmers and ranchers to stay in business. For many this is already the case.

- Market instability and a producer's tendency to live off appreciation has many in production agriculture on the edge of collapse.

Inventory management tools coupled with ongoing improvements in our farm credit system are necessary components of any agriculture policy, if we are to expect long-term financial stability for the American farmer.

TODAY'S CONSUMER

* The social contract between society and agriculture is changing. For years and years, the public has trusted agriculture to deliver food safely and be stewards of the land.

* That is still happening, but now the public has a growing perception that there are some questions that ought to be asked in relation to food safety and the environmental impacts of agriculture.

- The consumer is always right. And today, the consumer reigns supreme. They demand safety, nutrition and convenience.

- And they don't necessarily trust the agriculture industry (that includes USDA and the Agriculture Committee) to deliver -- because of the growing perception

that traditional production practices do not have the consumer's best interest in mind; but rather the farmer's economic gain.

- * It's time for a renewal of relationships and the bridging of gaps... we may find that our differences are not so diverse and that we have a lot more in common than we realize.

- That's why it's so important that everyone involved work together as a coalition.

- * We should not hesitate in stepping up to the plate and addressing these questions with honesty, confidence and a sincere effort to make sure it's being done right.

- * By balancing the interests of agricultural, consumer and environmental groups, our industry can maintain credibility with the American public.

SCIENCE AND TECHNOLOGY:

- * We will need to foster a meaningful dialogue among all parties. This must include a greater role for the public in the decisions about the implementation and utilization of emerging science and technologies.

- * Although the U.S. is a leader in the development of new agricultural biotechnologies, other countries are quickly establishing similar research and development capabilities.

- And if we reject these technologies, other countries will pick up the lead -- creating a distinctive for job opportunity and a competitive edge.

- * There needs to be a global approach to the regulation and acceptability of technology to create an atmosphere of mutual confidence between producers, manufacturers and consumers -- to remove unjustified technical barriers to trade, to promote uniform control of application of new techniques, and to prevent concern and confusion among consumers as to whether the measures taken in one country are equivalent to those taken in another.

INTERNATIONAL MARKETPLACE

- * All of these areas, and many more have tremendous impact on our nation's agricultural outlook in the international marketplace.

- * The financial stability of our nation's farmers and ranchers, the federal government's role in agricultural and fiscal policy, the role science and technology

will play, and the changing impact and influence of consumer and environmental groups -- are all forces that will help define agriculture's prospects for the future.

* As we stand on the edge of successfully negotiating a comprehensive, global and balanced package of trading rules, we have to recognize that without strong and enhanced agricultural trade, we greatly disadvantage our potential as an industry.

* Many commodity groups have expressed concern about increased imports into our country at their detriment, and I understand that. Trade reform should not rest solely on the back of one particular sector or group of U.S. agricultural producers.

* At any rate, efforts to achieve fair and equitable agreements should be pursued aggressively. Overall, success in agriculture increasingly will go to those who most successfully meet consumer needs and demands -- here and abroad.

* In this period of increasing opportunities, two things can be stated with certainty: The survival and living standard of our nation depends upon a modern, thriving agricultural sector; and the survival of our agricultural sector depends on how well American producers are able to adapt to change and meet international competition.

* In essence, agriculture faces a crossroad as it looks ahead. The stakes are high, but the opportunities and rewards are unlimited. Whether our industry continues its move forward or falls behind is largely dependent upon the vision and imagination of its participants, those of you here today.

* There is no industry better positioned for profitability in the 1990's. It's time to take a fresh look at the opportunities facing our industry, and see how current policies can be maximized in a rapidly changing marketplace.

Outlook '93**For Release: Tuesday, December 1, 1992****AGRIBUSINESS IN A NEW WORLD ECONOMY**

**Robbin S. Johnson
Vice President, Public Affairs
Cargill, Incorporated**

Agribusiness is a term that can and should be used to describe the entire "food sector" of the economy, including farmers and ranchers. As such, agribusiness provides roughly 17 million--or one in six--U.S. jobs. Four-fifths of these jobs--and the expected job growth--are now off the farm.

As we look at agribusiness in a new world economy, three clear and distinct roles emerge. Each of these economic roles carries with it a set of accompanying policy considerations.

These three economic roles and their policy contexts are:

- first, to increase efficient production and export of foodstuffs, which requires progressively freer trade policies;
- second, to promote growth and economic development, requiring market-oriented investment policies; and
- third to enhance the wise production and processing of foodstuffs, requiring balanced regulatory policies that promote continued innovation.

Let me discuss each of these concepts briefly.

Efficient Production and Trade

The first key challenge for agribusiness is to produce a larger, more secure food supply. Given the weak agricultural economy of the 1980s, there is an understandable tendency to underestimate the importance of producing and trading food more efficiently. But it is wrong to ignore this first and still primary mission of agribusiness.

Let me list some of the reasons why I believe this remains a primary role for agribusiness:

- Though world grain use grew little over the past six years, it still exceeded world grain production in four of those years.
- World grain stocks, at 19 percent of use, are the third lowest since the food crisis of 1974-75.
- As the world emerges from recession and the chaotic effects of the collapse of communism in Eastern Europe and the former Soviet Union, world grain use will start growing vigorously again. It should increase 20 percent or 350 million tons by the year 2000, an amount greater than the largest ever U.S. grain crop.
- Many households, especially in Africa, Asia and Latin America, still do not eat enough food; to close this gap would require by one estimate an 800 million ton increase in foodstuffs by the year 2000.
- Because food trade helps offset local production swings, the decline in export's share of world food use from 15 percent in 1980 to 12 percent today is another index--alongside low grain stocks--of greater global food insecurity.

These developments, taken together, mean that agribusiness--again, including production agriculture--still confronts a significant global challenge of feeding more people better. The United States could, once again as it did in the 1970s, play a leading role in meeting this fundamental challenge.

To play that role, however, requires more helpful world agricultural trade rules. Some might characterize that situation as the need for "free but fair" trade. I prefer a different formulation. Free trade is acknowledged to be attractive but unattainable soon. So, "free but fair" trade runs the risk of becoming the equally unattainable notion that trade is fair only when done on totally equal terms.

What we need instead is a firm commitment to a policy of freer trade. Wherever policies stand today, a freer agricultural trade policy commits us to move in the direction of more open markets. The recently negotiated NAFTA pact and the promise of agricultural liberalization through the GATT Uruguay Round are good examples of that policy commitment. Both take the world in the right direction--toward freer trade.

Engine of Growth and Economic Development

The second key role that agribusiness can play in the global marketplace is as an engine of growth and economic development. This role rests firmly on a fundamental set of relationships:

- first, hunger is rooted in poverty; inadequacy and insecurity of food supply both arise from the inability to afford a diet that meets basic caloric and nutritional needs;
- and second, since most of the world's poor people depend for their livelihoods on agriculture, breaking the poverty cycle means shifting from subsistence agriculture to commercialized agriculture.

The growth-retarding effects of subsistence agriculture are clear. Subsistence agriculture locks peasants out of income growth; it leaves populations outside the food-trading system and therefore more vulnerable to crop disasters; and it harms the environment through overuse of fragile land resources.

We are in the midst of a revolution to open up and to privatize economies throughout the developing and former communist worlds. This revolution creates a tremendous opportunity to improve the well-being of these people by accelerating rural economic development.

Agribusiness can play that role, in the process increasing both food security and job growth. Seed, fertilizer and implement industries will spring up. Investments will be made to store and protect foodstuffs once harvested and then to transport them to markets. Basic milling industries will develop, followed by further-processing of raw materials. Very simply, adding value to agricultural output is a cornerstone of economic development whether we are talking about Russia, Turkey, Malawi, Brazil or Thailand.

Agribusiness brings many things to its role as an engine of development. It brings capital to build and management to direct. It brings technology to increase efficiency and to open new possibilities. It brings services needed to preserve or enhance the value of foodstuffs. And it brings associated economic activity from its ripple and multiplier effects.

But agribusiness also brings some other values that are particularly important to the rural development challenge facing the United States today:

- along with new jobs, it often provides the health insurance coverage that may keep a local hospital from closing;
- along with economic activity, it can bring a commitment to improving education--from basic literacy to acquiring new job skills; and
- along with the quest for profitability, it can bring the leadership that helps build and sustain viable communities.

Obviously, these benefits cannot be brought to every rural community. But they can be--and are being--brought to many. Agribusiness remains the most potent private tool we have for rural economic development, both in industrial nations and in developing ones.

To function as an engine of growth and development, agribusiness needs appropriate investment policies. General tax and economic policies will shape this investment climate. But it is farm programs that really define agribusiness' investment climate.

The most appropriate investment policy is one that is market-based and geared to the comparative advantage of the regions involved. That means, on the one hand, avoiding excessive support for agricultural production or processing activities. Such subsidies are inappropriate because they attract capital that cannot sustain acceptable returns once the subsidy is withdrawn. This is the problem facing the European Community today, as other nations press it to reduce its agricultural subsidies.

On the other hand, taxing or restricting agricultural production or processing activities is equally damaging. Many poor developing countries are guilty of this, which explains why their rural sectors languish. But the United States also has been guilty of this mistake. Its unique reliance on land-idling policies has resulted in an unnecessary downsizing of rural communities:

- for example, a 1991 Economic Research Service study of 37 counties in northern Missouri showed that the Conservation Reserve Program cut farm supply sales by \$72.5 million and reduced total economic activity 5.7 percent in that area;
- a 1992 National Grain and Feed Association study estimates that U.S. land-idling programs during the 1980s cost rural areas more than 100,000 jobs and reduced total U.S. economic activity by \$42 billion.

In other words, for agribusiness to be a successful engine of rural economic growth, the policies that shape investment in agriculture must be market-based. Particularly for the United States, that means a shift away from the resource-idling practices of the past to rural "full-employment policies" in the future.

Those policies also should not support activities at levels that are not self-sustaining in the marketplace. But, America's strong comparative advantage in producing and processing foodstuffs will support much growth, if a stable, market-oriented investment environment can be established.

Wisely Protecting our Natural and Human Ecology

The final key role that agribusiness can play in the new world marketplace is to find more environmentally sensitive ways to produce, prepare, package and consume food. It is important to understand all that is being sought in this new ecological role.

First, agribusiness is being challenged to wring excess costs and waste out of the food system, largely through the successful application of productivity-enhancing technologies. Examples include:

- More precise ways of delivering fertilizers and agricultural chemicals so plants capture more of the available benefit while the surrounding environment suffers less harm.
- New processing technologies that reduce use of scarce or non-renewable resources, including energy, water and land.
- New plant seeds or animal breeds that perform to the specific use requirements of select customers.

Agribusiness also is being pressed to build in new value and values to how food is grown, prepared and used. Examples include:

- Providing more health--less fat and more fiber, for example.
- Providing more variety, convenience and even entertainment in foods--a kind of mass customization of the things we eat.
- Reducing plant discharges toward zero and capturing byproducts and waste for reuse or recycling.

Meeting these new demands is generating a wave of institutional innovation in cooperation and collaboration that goes well beyond the familiar idea of mutual dependence among farmers and middlemen. What is occurring is a fundamental realignment. Partnerships are spreading across once hostile lines. New alliances are being forged.

The policy environment required to optimize this emerging ecological role of agribusiness is one in which regulatory policy facilitates rather than blocks innovation. This will not be easy because regulation is becoming more commonplace throughout the food system, for a variety of reasons:

- more food production and processing occurring beyond the view of individual consumers;
- the ability to detect residues or to model risks has grown more rapidly than society's ability to evaluate and weigh relative risks; and
- scientific progress yields new products and new processes, providing the occasion for new regulatory decisions.

These developments require both a balanced approach to regulating the food system and more education about relative risks. To promote innovation while protecting health, sound science needs to be the foundation of both domestic and international regulatory policy.

Generally, such an approach will try to accomplish three things:

- it will empower consumers by providing them with more information rather than making consumption decisions for them;
- it will define regulatory objectives in terms of scientifically grounded standards rather than dictating the technologies or processes to be used, to preserve incentives for innovation throughout the food system; and
- it will calibrate the costs of regulatory compliance more closely to the measurable benefits achieved.

In other words, regulatory policy must serve both efficiency and ecology. Neither can be master, neither can be slave. For at least four billion people living today in developing countries, the principal challenge remains to increase the quantity and security of food supplies. For another one billion people living comfortably above poverty and hunger, there is an emerging interest in process quality and product purity. Regulatory policy must aim at feeding people wisely without impairing our ability to feed more people better.

Conclusion

To summarize, agribusiness has three continuing roles to play in the emerging global food economy, each requiring the appropriate policy context. To be an efficient provider of secure food supplies, agribusiness must look to governments for a commitment to freer trade policies.

To be an engine of economic development, agribusiness needs market-oriented agricultural investment policies.

And to enhance our natural and human environments, agribusiness needs a balanced regulatory environment that promotes innovation.

With such policies, agribusiness can play a major role in producing food, adding jobs and sustaining resources into the 21st century.

Outlook '93

For Release: Tuesday, December 1, 1992

FORUM ON MEETING THE CHALLENGES OF A CHANGING SOCIETY***Moderator:**

Dennis R. Henderson, Professor, Ohio State University

Panelists:

Randy Russell, Leshner and Russell, Inc.

Douglas P. Wheeler, Secretary for Resources, The Resources Agency
of CaliforniaJames R. Moseley, Director of Agricultural Services and
Relations, Purdue UniversityLawrence Libby, Chairman, Department of Food and Resource
Economics, University of Florida

DENNIS R. HENDERSON: Welcome to the session on Meeting the Challenges of a Changing Society. I am Denny Henderson, an agricultural economist with Ohio State University. I will be moderating this afternoon's panel discussion, and will be directing your questions after our prepared remarks.

For our session, we have a panel of four accomplished individuals with distinct but not necessarily similar views on the role of agriculture in a pluralistic society. What are the emerging challenges faced by agriculture and the food system? How do we respond to these challenges that arise from changing expectations as to what farms, agribusinesses, and others in the agricultural sector are to provide the society at large? To bring this issue before our panelists and to encourage you in the audience to challenge their positions, permit me to start with a few assertions.

First, the collective opinion of the American population and perhaps for much of the world, at least in the economically developed countries, regarding agriculture, swings on a pendulum between the extremes of an adequate supply of food to feed the rapidly growing masses of world population to a predominating concern at the

* Based on a transcript.

other end with the quality of both the food we eat and the environment within which it is produced.

Second, let me assert that the pendulum has currently swung well into the quality zone, that is, as a point of central tendency, society in the United States and perhaps throughout the developed world is now more concerned with quality in all of its dimensions than with quantity.

Third, the swing in public sentiment toward the quality dimension presents complex, unique, demanding, and timely challenges to the politicians of the day to regulators and others who carry out the dictates of public policy, to farmers and others in the food production and distribution chain, and to the public in general, and those whose purpose it is to see that this is an informed and thoughtful public.

To pursue this theme, we are asking each of our panelists to develop and elaborate the challenges from each of these perspectives: political, regulatory, producer, and the public. We are extremely well served to have four experts on the panel with a wealth of experience in each of these areas. I should forewarn you--they do not necessarily share the same perceptions. Each panelist will have about 15 minutes to present his perspective, to argue not only how the issue should be phrased, but also how it should be resolved. I will introduce each of the panelists at the outset of his remarks.

Concluding the remarks from the four panelists we will then open the floor to discussion. We will have microphones circulating on the floor so you'll be able to ask your questions directly to the panelist. I will referee that process and may interject some of my own thoughts in the process as well, taking the prerogative of the moderator.

We will begin the panel discussion with the political perspective. This is propitious given that the nation has just spoken clearly and decisively at a national election. To present this perspective, we have with us Randy M. Russell, a principal with the firm, Leshner and Russell of Arlington, Virginia. A native of Virginia, Randy completed undergraduate and graduate studies in economics at George Mason University. He has served in a number of agricultural policy positions, both in government and the private sector. These have included Deputy Assistant Secretary for Economics, Executive Assistant to Secretary of Agriculture John R. Block, Economist for the Senate Agriculture Committee, and Director of Government Relations for the Pillsbury Company. I'm pleased to present Randy Russell.

RANDY RUSSELL: Thank you very much, Dennis. It's a pleasure to be here at the Outlook Conference for 1992.

I'd like to talk to you about three issue areas today. The first is providing you a little political overview of the election. Second, I'll talk to you about some issues that are facing agriculture over the next 10 to 20 years, and finally, end by the talking about the reorganization of USDA. Let's first look at the outcome of the 1992 election. As all of us know, in November president-elect Bill Clinton won with 43 percent of the vote; George Bush got 38 percent of the vote. I've heard a lot of people say that President Clinton's election clearly showed that there was a mandate for change. I would beg to differ with that assessment. I said rather than it being an election for change, I think it was more about a repudiation of the President's domestic agenda. More importantly, I think it was a repudiation of his domestic economic policies. But if you look at what happened in rural areas, it's very interesting. The Center for Resource Economics just recently put out a report following the election that showed in 512 farming-dependent counties, as defined by USDA, that George Bush carried 40 percent of the vote, Bill Clinton carried 39 percent of the vote, and Ross Perot carried 21 percent of the vote. In fact, George Bush carried 63 percent of those 512 farming-dependent counties. So clearly, President Clinton did not carry the rural areas and the farming areas of this country.

When you look at Congress, you notice a little bit of a change. In the case of the House of Representatives, 110 new members were elected. However, the ratio of Democrats to Republicans has not changed markedly. We have 261 Democrats, 172 Republicans, and 1 Independent. In the Senate, although we have 11 new members, the ratio stayed exactly the same: 57 Democrats to 43 Republicans, barring the outcome of the December special election in North Dakota for the seat of deceased Senator Clinton Burdick, which Senator Conrad is expected to win.

Now, what does the election mean in terms of the issues that agriculture will face, not only for the next 4 years, but over the next 10 to 20 years? I'd like to talk about three specific issues. Number one is the budget deficit and its impact on agriculture and farm program spending; number two are the whole array of issues in the trade agenda; and then finally, environmental issues.

Let's first look at the budget deficit. CNN did an exit poll on election night. They asked voters, "What is the number one issue that you would like to see the new president take on right off the bat as part of his new administration?" Fifty-six percent of the people chose reducing the federal budget deficit; that was more than twice the percentage that any other item received--including cutting taxes, increased spending on health care, etc. So clearly deficit reduction was on the minds of the voters when they went into the booth last November.

President-elect Clinton has promised to reduce the federal budget deficit by over 50 percent by the end of his first term, and yet no serious federal budget deficit

legislation can be passed without taking on entitlement programs. Entitlement programs in 1992 made up \$708 billion of our \$1.4 trillion budget. Just over 50 percent of our budget goes into entitlement programs--Medicaid, Medicare, veterans' benefits, and farm programs. So it's very likely that any deficit reduction package that passed by Congress with the blessing of the Clinton administration in 1993 will indeed attack entitlement program spending, including farm program spending.

In 1990, when we needed to save money by reducing agricultural spending--by nearly \$1 billion--how did we do it? We did it by increasing the amount of acreage that went unpaid--the so-called triple base flex acres. I think what you will see, not only in 1993, but in future budget debates, is that Congress will simply increase the percentage of triple-base acreage in order to save money. And I'll make a prediction today: by the year 2000, with continued pressures on our federal budget due to rising health care costs and growing interest costs, and growing interest costs, national debt, entitlement programs will be pared down. Farm program spending, particularly in the area of farm income supports, will be reduced to the point when you combine it with the conservation compliance provision and some of the environmental restrictions that are being placed on farmers today, that a majority of commercial family farmers will opt out of the domestic farm program. That's clearly the trend, and we must, in agriculture, be prepared for it.

The second area that I'd like to talk about in terms of issues are trade. The Clinton administration will face a whole host of trade issues. The MFN for China has great bearing on our wheat markets. Another challenge is ensuring that NAFTA is not only finally agreed to with parallel agreements on labor retraining and environmental concerns, but also that it is fully implemented. President Clinton will also face the prospects of having to finalize the Uruguay Round of GATT. Now both of these, in my judgment, are vitally important to the interests of American agriculture, particularly when you look at the fact that only 5 percent of the world's population resides in the United States. The antithesis of that is that 95 percent of the world's population resides outside of the United States, and if you believe that U.S. agriculture has a comparative advantage in the production and marketing of our products, then efforts through regional trade agreements and through multilateral trade agreements, such as the Uruguay Round, and that reduce tariff and nontariff trade barriers, that reduce reliance on export subsidies, and that reduce domestic farm program policies that distort trade, will allow the United States to capture a larger share of a growing world market. This becomes particularly important if you buy my theory that by the year 2000, over half of commercial family farmers will no longer participate in farm programs because they are no longer economically attractive. Therefore, more of our income is going to have to come from the marketplace, which is now a global marketplace, rather than from the farm programs themselves.

The last challenge that we face in terms of issues, and one that I would call a nontraditional farm program challenge, is in the environmental arena. If I had to pick one area that is going to prove to be the major stumbling block for U.S. agriculture over the next 20 to 30 years, it's going to be dealing with the environmental agenda. For example, how do you define a wetland and what can you do with property that is determined to be a wetland? What kind of farm production can occur on it? Food safety legislation affects the registration and reregistration of pesticides. Reauthorization of the Clean Water Act, relative to nonpoint source solution, has a major impact on U.S. agriculture. The Endangered Species Act contemplates habitat protection plans that could greatly affect chemical usage and overall development of property. All of these issues are going to have a profound impact on agriculture, from the perspectives of the productivity of our sector, efficiency, the ability to compete internationally, and most importantly, profitability. So I think as we look into the next 10 to 30 years, the issues impacting agriculture most significantly are going to be trade and environmental issues, and to a much lesser extent, and with less and less influence, domestic farm programs.

And that brings me to the last topic I wanted to talk to you about, USDA reorganization. Over the past year, we've heard an awful lot out of Congress and Secretary Madigan regarding USDA reorganization, and I want to commend Secretary Madigan and Senators Lugar and Leahy, and Congressmen Glickman de la Garza and Roberts, for their efforts to try to get this to the forefront. I do have one criticism of their collective effort, and that is, that they are focusing on a very narrow agenda. They want to look at reorganization from the perspective of consolidating offices, which I strongly believe needs to be done and they're talking about, in the case of Mr. Glickman, setting up a farmers' services-related agency, that might combine the Agricultural Stabilization and Conservation Service, the Farmers Home Administration, the Soil Conservation Service, and possibly some other agencies into one office. I think this approach will improve efficiency; I think it will reduce costs administratively, but if that is all that is involved with the next stage of the reorganization of USDA, I believe that we have seriously missed the mark.

Remember what I just talked about: What are the issues and challenges that American agriculture is going to be facing over the next 20 to 30 years? It's not domestic farm policy but rather it's trade issues. It is environmental challenges, and I don't believe the Department today is adequately organized to address those issues. Therefore, I would like to propose that our lawmakers and the new Secretary of Agriculture first of all start off with a very bold move and broadly challenge the people in the Department to think about a much broader reorganization plan, one where the mission statement of USDA is redefined, and an organizational structure is set up to meet these new challenges. I believe that if we

do not do this, not only will we have expended a great amount of political capital on a reorganization proposal that will not serve agriculture well, but most importantly, we will be doing a great disservice to the employees of USDA as well as to those it serves--the food industry, farmers, consumers, forestry interests. And we will leave USDA ill-equipped and ill-prepared to meet the challenges that we face in the environmental and trade fronts over the next 20 to 30 years.

Thank you very much.

PROFESSOR HENDERSON: Thank you, Randy, for those very insightful and provocative comments. We'll next turn to the perspective of a policy administrator, someone who not only influences public policy, but also has the responsibility for carrying it out. For this task we are fortunate to have Douglas P. Wheeler, Secretary of Resources and administrative head of The Resource Agency, a member of Governor Pete Wilson's cabinet in the State of California. A long-time leader in the field of conservation, Doug has served as Vice-President of the World Wildlife Fund, Executive Vice-President of the Conservation Foundation, Executive Director of the Sierra Club, founder and president of the American Farmland Trust, Executive Vice-President of the National Trust for Historic Preservation, Deputy Assistant Secretary of the Interior, and legislative counsel for the Department of the Interior. He is a graduate of Hamilton College and Duke University School of Law. Please help me in welcoming Doug Wheeler to the panel.

DOUGLAS P. WHEELER: Thank you, Dennis. Good afternoon, ladies and gentlemen. Of those many assignments which have characterized my 20- or 25-year career in resource management and conservation, perhaps the one of which I am the most proud is my role in helping to organize the American Farmland Trust, now 12 years or so ago. I am particularly proud of an association with someone who is still an important part of the team at AFT, Norm Berg, who is here in the audience today, bringing his considerable expertise and a lifetime commitment to the need to integrate our concern for agriculture as an industry and as an economic sector with our concern for the protection, the management, the stewardship of the resource base upon which agriculture depends, particularly the soil and water which is essential to its sustainability. That was the challenge to AFT 10 years ago. It is the challenge, I think, to all of us today. It is certainly the challenge we confront in California. We are talking about the challenges of a changing society. I would posit as a relatively recent returnee to California that nowhere in the United States is there a society changing so rapidly as in California, and nowhere, incidentally, is there a society in which agriculture plays so large a role. It is the conflict or the apparent conflict between those changes and the role of agriculture that I'd like to focus on for a few moments this afternoon.

In California change today means a lot of things, but principally, population growth and the development that is associated with population growth. Everyone knows that in California as elsewhere in the country we are experiencing an economic downturn. It is more severe in some sectors there than it has been nationally, but nonetheless, we are right on target toward achievement of a dubious distinction--the fact that California's population will continue to grow to the point where at the year 2010, there will be 41 million of us, another third as many as exist in the state today--roughly 30 million or so. And it is interesting to note that in the period for which we have the most recent statistics, 1991, growth is on target toward meeting that projection. Notwithstanding the economic downturn, the state grew by 675,000 net new Californians last year, the size of the city of San Francisco all over again, and that pattern will continue to repeat itself well into the next decade. Population growth and development infer an increasingly urban configuration of our land use and increased competition for scarce resources, notably those which are most important to agriculture--land and water.

I ought to note that while we project an increase of a third in the size of the state's population overall, the numbers are even more dramatic for that part of the state, the central valley, which sustains our greatest agricultural productivity. For that region, it is suggested that the state's population will grow by 50 percent in the next 20 years. So the conflicts could not be more real, and they are manifest even today in competition for these scarce resources including water and land. But, overlaying those competitions for natural resources, overlaying that increasingly urban character of our state is a very sophisticated population with increasing demands, as Dennis has already noted, for environmental quality. I think it is probably true that everywhere in the United States better than half, maybe three-quarters, of the population define themselves as environmentalists. The percentage is consistently in the eighties when the people of California are asked, "do you subscribe to an environmental ethic or an environmental point of view?" You have therefore a nonpartisan issue, if there can be such a thing, in which Democrats and Republicans alike attempt to address the concerns of the vast majority of Californians who yearn for a strong and vital economy on one hand, and on the other an increasingly protected and enhanced quality of life reflected by our health consciousness, and our concern for the physical environment.

The challenge to agriculture in California, and I suspect the challenge to agriculture everywhere, is the integration of those concerns. Governor Wilson and I and those in his administration eschew the notion that we heard discussed so frequently during this election campaign, that we have to make a choice on the one hand between the economy, and on the other, the environment. We believe, and I think agriculture should understand, that they are absolutely interdependent parts of the same whole. We have learned in California--indeed, I have learned over the course of the 20- or 25-year career as a conservationist--that we will not have strong

environmental protection and the wherewithal to provide public programs to sustain the environment unless we have a strong economy. And conversely, we will not have a strong sustainable economy unless we take care to protect the resource base upon which that economy depends. And nowhere is that integration more important than to the future of agriculture in our state.

But it's easier said than done: Protect the economic base of this single most important element of our state's economy, provide for an increasingly urban, increasingly diverse population--now 30, soon to be 40 million--and assure the sustainability of California's agriculture from an environmental standpoint. The challenge to us, it seems to me, is to integrate those concerns; to make clear that these are not mutually exclusive alternatives, and to do that which I had hoped to promote with the establishment of the American Farmland Trust more than a decade ago, build bridges between those who are committed to conservation and those who understand the significance of agriculture as an economic endeavor.

Let me share with you just a couple of examples of the ways in which we are attempting to integrate those concerns in California, because I think they may offer to you suggestions about the way in which we might confront this paradox which Randy has described. First and foremost in California is the competition for water. We are in the seventh year of a severe drought in which even today we have forecasts for this year of less than normal precipitation. I have already said that water is absolutely essential to the success of California's agricultural economy. So too is water essential to the success of our efforts at protecting the environment and to our ability to provide a reasonably healthy quality of life for those 40 million Californians. We have 8 million irrigated acres out of a total of 30 million in the state. They typically, and this has not been a typical period, consume something like 26 million acre feet annually, about 80 percent of the state's total consumption, which has given rise to concern on the part of those in the other sectors that agriculture has not done its fair share to conserve water or to make use of it so as to assure an adequate supply for other sectors. We are working with the agricultural community in California first of all to improve its effort at conservation, which effort, I think, is progressing very well indeed. In fact, the state has learned across the board to conserve water--usage was 30 percent below normal last year in the face of the sixth year of drought. But perhaps most significantly we have harnessed the market force to establish a water bank, the principal participants of which in 1991 and again in 1992 were the farmers of California. They voluntarily sold to other users at a market clearing price some 800,000 acre feet of water in 1991, reallocating water in response to a market signal and in a way which meets the legitimate urgent needs of agriculture while also providing augmented supply to other sectors. Conservation of water and the market-based reallocation of water have served both the people of California as a whole and our agricultural economy.

Another example of this effort to integrate our concern for the environment and our concern for the agricultural economy is the work that the rice growers of the northern Sacramento Valley are doing to keep their fields flooded longer, to reduce some of the environmental risks associated with burning rice straw, to provide on-field storage of water for a longer period than would otherwise be the case, and not so incidentally, to provide an extraordinary augmentation of water fowl habitat during the season in which the Pacific flyway is the most active. This effort on the part of California's rice growers has attracted wide support in our state, including the very active support of some former critics of that industry and the active participation of large parts of California's conservation community.

We are very active promoters in another effort at integration of the wetlands reserve program authorized just a couple of years ago by the farm bill as a way in which we meet the need to protect California's dwindling wetlands resource, another issue that Randy has identified. We are now left with something like 10 percent of the original extent of the wetlands resource in California--about 100,000 acres is all that's left. We seek to protect those important acres while compensating farmers for the public value which is represented in protection of that acreage. That seems to me a way in which to recognize a farmer's equity, to allow him or her to continue to farm, and protect the wetlands resource simultaneously. In those places where we have contaminated agricultural land as a result of natural phenomena and irrigation, particularly on the west side of the Central Valley, we have just authorized an agricultural land retirement program. This too, is a program which relies as does our water marketing effort on the voluntary participation of California's farmers and ranchers. We hope to finance this program through the sale of water rights from land which can no longer be usefully farmed because of environmental and constraints. It would be retired from active cultivation and managed for its habitat value while making the owner whole, reducing any fear or concern about confiscation of property rights. This is another integration of the public concern for environmental quality which recognizes the farmer's equity in his land and in his investment.

Conversely, with respect to truly important agricultural land in the Central Valley and elsewhere that is going to be most affected by the onslaught of population growth in our state, we are beginning to examine ways in which to enhance the protections afforded by the Williamson Act, California's first-in-the-Nation effort at providing tax subsidies in the form of rebates to farmers whose land is valued not for development potential but agricultural use. We are also exploring the kind of growth management program that will assure retention of agricultural land, even as we plan for a future that is going to be more densely populated and more urban, even in places where agriculture now thrives, such as the Central Valley. Retention of prime agricultural land, therefore, is the other side of the land retirement coin. We'll retire land which is no longer productive for environmental reasons, making

sure to protect land which will contribute to the agricultural economy in California, as part of the Governor's overall growth management strategy.

And finally, as an example, we are mindful of the need for agriculture, like every other industry in California, to remain competitive both in the U.S. and in the world marketplace, for government regulation not to be an undue burden even as we attempt to express the public concern for environmental protection. That means for us, and for my counterparts at California's EPA, a streamlining of the regulations which pertain to agriculture, and an integration of our review of the environmental consequences of development activity, such that we are not dealing project by project in a burdensome way, but dealing with the aggregate impacts of development activity in a way that more nearly meets the original anticipated benefits of our environmental review law--the California Environmental Quality Act--which is the analog to the National Environmental Policy Act. I hope that by just citing a couple of examples, I have given meaning to the claim that we in California believe it is not only possible but absolutely essential that agriculture not regard the environmental challenge as a stumbling block, to use Randy's phrase, but as an opportunity to become part of the statewide concern for environmental quality, but which concern also acknowledges the absolutely essential nature of agriculture's contribution to California's economy. In addition to demonstrating the integration of these seemingly conflicting objectives, we need also to communicate such possibilities to the people who make decisions about the way in which agriculture is conducted and regulated in California and across the Country. As a member of the executive branch, I am painfully aware of the fact that California's legislature is increasingly urban. These 40 million Californians are 97 percent urban dwellers, or will be. They are more removed from the reality of agriculture, more removed from experience with agriculture, than any other previous generation, and so too are their representatives in the legislature in Sacramento. I suspect the same is true here on Capitol Hill. We have the need as advocates of agriculture to explain to that changing constituency in this changing society that we can and will be partners in this effort, both to achieve a sustainable agriculture economy and to achieve environmental quality.

Thank you.

DENNIS R. HENDERSON: Thank you very much, Doug, for sharing those experiences and the situation in California with us.

The perspective of an agricultural producer will be ably presented by James R. Moseley, Director of Agricultural Services and Relations for the State of Indiana at Purdue University. In his present capacity, Jim Moseley has the administrative authority for state agricultural services and regulatory functions in Indiana. He was assistant Secretary of Agriculture for Natural Resources and Environment

earlier in the Bush Administration, and also served as agricultural adviser to the administrator of the U.S. Environmental Protection Agency. A graduate of Purdue University, Jim is a grain farmer, a pork producer, an adviser to many of America's leading organizations on environmental issues, and staff political analyst for the Farm Journal Publishing Company. Jim, we look forward to your comments.

JAMES R. MOSELEY: Thank you for that kind introduction. It's good to be back in USDA for a few moments. Many good memories reside here from my previous experiences.

Today I was asked to think about and address the topic of "Meeting the Demands of a Changing Society" and to do it from a farmer's perspective. When I left USDA I returned to the farm. Going back to production agriculture allowed me time to reflect about my experience in policy and its relationship to my farming experience. I'm going to try to blend what I learned here with the voices of thousands of farmers that I've had the opportunity to listen to over the past four years.

Of course, before we can address the demands of change we have to understand the nature of the change itself. There are any number of areas where we see this dynamic process causing stress in the agricultural arena. Consumers are looking differently at such things as diets and the safety of their food, at convenience built in so working parents have time to do other things. They're looking at the world around them and growing frustrated with their fellow urbanites as they develop bigger and bigger communities; they like this growth on one hand for the things it affords them, yet they look beyond it and wonder what it will mean for their kids. Even though they've never seen a spotted owl or a desert tortoise, there's something that tweaks their conscience when told perhaps their children won't even have that option. They lament the perpetual change of the landscape...why can't it be the same as it once was? What about all these open spaces being filled up? Why are there so many people? And what about all of this they hear on TV? Have our farmers really become so self-centered that they would pollute the land and poison our food? Interesting questions.

And then we move to the other side. The farmer: independent...tough...hardened by adversity and worn by weather. And farmers respond with a confused look to the suggestion that as this change evolves, they may be at odds with their counterparts in the rest of society. Farmers believe that they have always enjoyed great respect from their urban neighbors, primarily because of an understanding and respect for the difficulty of farm life as they attempt to offset any number of high-risk variables. In addition, until recent years, farmers have been viewed as hard-working stewards of a vast portion of our natural resources, providing food that keeps the remainder of the population well fed. Why have those they feed suddenly begun to appear ungrateful and to question their motives of integrity?

Confusion is an understatement and defensiveness a predictable result. Why has this happened? The question could lead to an exhaustive government study costing millions; however, allow me to give you some insight that costs only a few moments.

Until the last generation or two, most urbanites had some tie back to farming. Their grandparents, or some remote relative, at least lived a farm or had done so. But now we're moving into generations that have no such attachment. This detachment, along with the help of a few political activists, seems to have created a public that thinks differently about farmers.

There seems now to be a sense that farmers are always over-productive, that we have more than enough food to feed people, and that the starvation concerns in the world are related only to political and distribution problems. In fact, the concern we heard just a few years ago about not being able to feed the world has become a faint, feeble voice lost in the roar of more pressing interests. And of course, every year around appropriations time the cost to the American taxpayer is raised by the subsidy question "necessary" to keep farmers in business.

More important, farmers are losing the image of being stewards of the land. They are more frequently portrayed as a group of self-interested business-maniacs doing virtually nothing good, and any number of bad things to the environment, and really not worried about safety of the food they provide. The agricultural production practices that have helped to feed this nation and much of the world are being questioned as the perception grows that if we continue our present methods of farming we are surely to have an ecological disaster unparalleled in human history.

I can tell you this comes as a shock to the agricultural community. It never occurred to us that someone would coin us as the "villains" in ecosystem management or call us "rapists of the land." At least not from people who were the beneficiaries of an abundant food production system.

Overstatements? Perhaps, but words shape attitudes, and attitudinal changes lead to behavior change--positive or negative. In the debate over natural resource and environmental policy, the area that manifests this changing relationship perhaps as well as any, we have developed an unnecessary polarity that has turned us in a direction away from problem solving. We have moved away from an approach of placing our energies on working toward solutions, instead focusing our attention toward political battles that confuse rather than define the real issues of concern to us all. Likely there are some who would disagree with this analysis, but I can tell you it does reflect some of the confused feelings and attitudes coming from the agricultural sector.

So how do we manage this change of attitudes within society? Clearly, it's not very easy considering the extremes in the thinking. And from my perspective as a policy person that's one of the real problems: we are being pulled back and forth by the extremes in the debate. And when this happens we often go whizzing right on by the solutions without even recognizing them. But our assignment is to suggest, at least for discussion purposes the opportunities we farmers have to manage within the context of these societal changes. Again for the cost of only a few minutes, allow me to take a crack at it.

First, I think it's important for the American public to put the agricultural pollution problems in perspective with other environmental concerns. For example, solid waste management and storm sewer runoff from cities continue to be talked about quietly while agricultural runoff moves to the top of the concern list. That is not to downplay the soil erosion problems we have, but in understanding the difficulties associated with issues related to their personal lives, it helps the public understand the difficulties in managing toward solutions where they are not directly involved. It's going to be tough to solve the storm sewer problem because so many people are part of the problem. Politically there's going to be a lot of gnashing of teeth. But if you understand the dynamics of that problem, it puts solutions of other problems in perspective.

Second, I think we need to focus our attention on solving real problems that have been prioritized in relation to their relative risk to health and environment. Frankly we are wasting valuable resources toward solutions on more pressing problems. Right now we are picking the issues like the old army recruiter rode into town looking for sharpshooters. He finds some targets with bullet holes right in the bullseye. After going into the local tavern to find the source of this marksmanship, the bartender directs him to the old town drunk. When he approaches the drunk over his amazement in his skill, the drunk responds, "Aw gee, sir, I just shoot first and draw the targets later." Unfortunately there are some who are shooting off their policy guns and we're chasing after their targets irrespective of relative risk to society.

Third, we need to recognize where the solutions are likely to come from. Will they come from the Congress and the courts or from listening to scientists explain cause and effect and putting up the dollars to fund the research to find the answers? One of the things that confuses me is the notion that man producing food is harmless and risk free. We cannot help but put some strain on the natural resource base. It's inevitable. There is a natural conflict between man and his environment as man seeks to sustain himself. The challenge before us then is to produce our needs with as little impact as possible. I continue to believe that we must rely on science and technology to do that. I am aware however, that this concept has fallen from favor. It shows in the decline in funding going into public sector research in the

past few years. And I suspect a bit of this is because of the constant mantra of those who believe that technology leads to development,...and development leads to environmental problems. But if we have any hope of finding the balance in this natural conflict I talked about in agriculture, it must come from scientific discovery, not another law book.

Now let me turn my attention for a moment inward toward the agricultural community. Society does seem to be speaking rather clearly that while they expect adequate food supplies, the loss of our natural resources is not acceptable. Most farmers believe the same, however, a few don't. We cannot afford to lose credibility protecting a few who chose to ignore the evidence and continue to take irresponsible actions. When they pollute a creek because of improper manure handling or pesticide application, things that they could have prevented, we need to speak out and let the rest of the world know we don't condone that kind of management.

That also implies that the remainder of us will do what ever we can to make sure that we are managing properly and doing things right. While that can cover a lot of territory, one of the more important things I think it means is implementing new technologies when they are available. Obviously we have to use reason here. As a farmer I understand we can't go out and buy the latest technology at the moment of release. In particular, high investment capital items take time to depreciate, and it is unreasonable to expect wholesale change in a year or two when the normal life of investments such as these may go on several years. That's the part of the reason why I'm pleased to see so much progress in the changeover to conservation tillage in just the past two years. It's an adoption process that is working because there was recognition by a few that we needed to look closely at the economics. People who don't have a debt down at the bank, but operate their lives out of a Washington office, might not understand that.

However, over the long term we need to be moving in the right direction. For example, I do think the evidence is solid on residue management and its impact on reducing soil erosion. We need to be implementing that as fast as we economically can. In fact, there are strong economic incentives to do so. But beyond that there's even more good news. There's an excitement beginning to build over a whole new area of technology that will revolutionize crop farming. Linking computers, satellites, sensors, and other electronic gadgetry is going to allow us to become very site specific in our farming practices. Precision application of inputs, coupled with measuring yield potential so we know what inputs and measuring yield potential so we know what inputs to precisely apply, is going to optimize yield performance and at the same time reduce the potential resource impact. Imagine being able to apply, on a foot-by-foot basis, the exact amount of nitrogen necessary for crop production...this dramatically reduces the potential for groundwater impacts. Or sensors that target the pest and apply only the pesticide when needed. Instead of

treating the entire crop scientists have suggested that most times as little as 15 to 20 percent usually needs application. These are some exciting new opportunities on the horizon for farmers to do it "right." We need to implement them and society needs to be patient.

One final point, though: if we work to "do it right," that doesn't mean all will be well. Here I tread into shark-infested waters politically, however, we in the agricultural sector must realize that even done perfectly, there will always be other "political objectives" driven from outside forces. There is major disagreement over issues such as land use and social objectives, and there's also the willingness by some just to keep the fight alive because it's there. In this regard this sector of our economy, this way of life, will always be challenged because food is an important political tool and land control, no matter how noble the reason, is power. Therefore, as we have continued to hone our skills as managers of production...of finances...and markets...so too must we now sharpen our skills as "managers of issues." I wish it were not so: I know that some even find it distasteful to think about. However, in law, both in the Congress and the courts, in public relations and public education, the story of agriculture, and the fundamental relationship we have with society, is not being adequately heard. That perhaps is our greatest challenge of all as we help manage the changing relationship that we have with society. I hope we have the vision and determination to do it well. Thank you.

DENNIS R. HENDERSON: Jim, thanks very much for those insightful views from someone on the ground, as we would say back in Ohio. The perspective of an informed public could have no more of an eloquent spokesperson than Lawrence W. Libby, Professor and Chair in the Department of Food and Resource Economics, University of Florida. Larry Libby has held his current position since 1987. He writes and speaks widely on natural resource policy issues. Prior to accepting his current position, he was on the agriculture and economics faculty of Michigan State University, where he taught graduate and undergraduate courses in land economics and policy analysis, and conducted research in extension programs emphasizing soil and water policy and environmental quality. He has had special assignments with Resources For The Future, the Secretary of Agriculture's office of Environmental Quality, and as executive director of the New York State Commission on Preservation of Agricultural Land. He recently completed terms as President of the Southern Agricultural Economics Association and as Director of the American Agricultural Economics Association. It is with great pleasure that I welcome Larry Libby to this program.

LAWRENCE LIBBY: Thank you, Dennis, very much, for a gracious introduction. It is absolutely pretentious of anyone to stand up here and say that they are going to talk about public's expectations because no one can do that, obviously. But having been given the task, I will forge ahead. I'm also keenly aware that virtually

anything useful that could be said on this subject has probably been said already here this morning and early afternoon. Perhaps my comments may help to bring back some of the themes that you've heard from earlier sessions and help to focus for the rest of the program over the next couple of days.

It is my feeling that farming still enjoys a generally popular image. There's a reservoir of good will around the United States. It's not explained just by the number of farmers. We all know that the number of people on the land has dwindled dramatically in past years, but that does not explain the continuing support of agriculture and agricultural people. It goes well beyond the number of people involved to the various images of agriculture, the healthy outdoor lifestyle, and the sorts of things that have already been referred to.

Having said that however, it seems to me that the reservoir may have a slow leak, or perhaps a better metaphor would be that there is a very broad reservoir of support but it's fairly shallow and subject to evaporation every so often. People are increasingly insisting on responsible behavior by farmers, but people are not inclined to give them additional special privileges. In the past, farmers have received a number of exceptions on tax laws and on various kinds of environmental regulations, all with good reason, and all with a careful debate. I think that people are saying it's time now for a quid pro quo; it's time for agriculture, and farmers in particular, to be responsible with their resources and to earn the respect and earn that level of support that I still feel exists.

Suburbanites are used to being regulated in their use of land and water. They know what it's like to have limitations on the use of resources. So they are not terribly sympathetic with the notion heard from some farmers that their land is theirs to do with as they wish under all circumstances. That myth of complete ownership is something that other people have come to grips with already, and they expect farmers to do so even more than they have. They want farmers to be good citizens, and to be members of the broader society.

It's important to recognize, in clarifying this issue of the public expectation for agriculture, that scientific validity of issues does not replace perceptual validity. In other words, what consumers think about pesticide residue or risks associated with certain agricultural practices with respect to groundwater is important--simply because it exists, and has to be taken seriously. What consumers really don't trust--they trust farmers, I think--is science. Those of us in the scientific community have a major task in helping the broad range of physical, biological and social sciences to have a more respected position in the public perception of taxpayers and consumers. Should not try to hide behind science and expect that science will somehow carry the day in debates with consumers about food safety, animal rights or welfare, water quality, or risks associated with different kinds of agricultural practices. It's

a very risky strategy for agriculture and for farmers, in particular, to parade groups of scientists who present results that are somehow inconsistent with consumer perceptions as if that were going to solve the issue. Science has to be digestible and usable, but it's not sufficient and it doesn't deny the perception that consumers and taxpayers have about the risks that they face.

The worst strategy of all is defensiveness and the attempt to use scientists, at land-grant universities or otherwise, as a shield against the inevitable processes of change. Consumers want honesty; they want caring by the users of land; they want farmers and scientists to take them seriously. Big business agriculture, the result of science and all of the efficiencies that have been generated and the productivity increases that have been documented so well is not likely to engender great sympathy. The fact that we have been successful in increasing productivity carries an inherent risk of its own. The idea of creating surplus and then paying farmers for not producing, adding to the deficit problems, with taxpayers absorbing all the risks for farmers, may be a cliché and inaccurate, but it is part of the image that big business agriculture has to deal with. Resisting regulations on hazardous chemicals and on labels and underpaying workers, in some cases, while well-documented hunger problems exist not only around the world but in many parts of the United States as well, also are facets of this image. In many cases success can be a burden in terms of the popular perception of agriculture.

What is needed? I'd like to turn now to some prescriptions to improve the living and working relationships between farmers and the general public, with respect to this demand for responsibility and the expectation that farmers and others in agriculture will be good citizens.

First, we've got to work on general economic technical and technical literacy about what agriculture is. There's something to the cliché about people thinking that milk comes from Kroegers, or Winn-Dixie in my part of the country. People have to have a better understanding of what agriculture is, and even more importantly, what it isn't.

For example, sustainable agriculture is on everybody's list of issues. If you watched McNeil-Lehrer last night, you saw a segment on the Great Plains and the need to retain all of the vitality associated with a natural ecosystem. And there's a tremendous amount of truth in that. The unspoken message there was that the more traditional forms of agriculture are unsympathetic, uncaring or insensitive to the biological and ecological realities. The facts are that some conditions of sustainable agriculture as a phrase and a set of systems makes a lot of sense, but the public has to understand its limitations and to try to get away from the notion that a farmer's hesitation to adopt low technology systems somehow indicates his or her indifference, contempt lack of sensitivity to environmental imperatives.

There's a lot of education to be done on the relationship between agriculture and the quality of rural life. Many in agriculture continue to feel that all you have to do is increase farm incomes and, lo and behold, things get better in rural areas. We know that's not the case. There's a lot more to the rural poverty question and rural hunger in America than farm income, and somehow people have to be able to understand the relationship between agriculture as an enterprise, agriculture as a sector of the economy, and the general quality of economic life in rural areas. So my first prescription is more attention to help the broad citizenry understand what agriculture is and what it isn't.

Second, farmers must avoid the temptation, almost on instinct, to defend themselves, to pout, and to declare that those people out there just don't understand and therefore can't possibly know what our problems are. In many cases, the leadership of agriculture may be behind farmers themselves. At many meetings, I've heard speakers both at the state level and the national level, farm leaders and even some agency spokespeople pander to the fears of agriculturists, of farmers in particular, of being unloved and not appreciated, and I would argue to the detriment of the entire system.

A variation on this is to avoid all of the conspiracy theories that seem to abound in the relationship between farmers and the rest of society. Environmental groups, animal rights groups and the press are favorite targets of conspiracy theories. These may appear to true in some cases, and there are instances that you could cite where that in fact that is the case. But if we allow ourselves to fall into that trap, eventually it becomes a self-fulfilling prophesy that there is a conspiracy because we have created one, and I think that is the most devastating and ill-advised policy strategy of all.

The third prescription: On the other side, farmers need a better understanding of the policy process. Many agriculturists and farmers, in particular, are incredibly naive about how policy works, and easily convinced by various kinds of conspiracy theories. There is a reliance on a zero-sum politics; either we get it or you get it, and we can't possibly work together. Farmers have to be a more vital and active part of the policy process. They need to participate especially at the local level, in their communities, on county commissions, planning boards, or advisory groups for governors and presidents of universities. Farmers need to be active participants. They should not hold policy at arms' length as if it's somehow a dirty process that somebody else is engaged in order to take things away from us, but become a part of that process and understand more fully from the inside how it works. Farmers should not function as farmers in that activity, but as citizens who have a particular set of knowledge and understanding. Don't become predictable; don't become always a protector or an arguer on behalf of so-called farmer interests. I see that

too much in my own state of Florida. I've seen it also in other states, where farmers are brought into the process but only to play a fairly narrow role.

Fourth, we have to move toward nonregulatory solutions to the problems associated with the link between agriculture and other communities in the policy process. We are so bogged down in many situations by rules that constipate the system, prohibit sound reasoning, require a tremendous expenditure of enforcement and create inevitable confrontations. I think we have become too litigious; we've become too regulatory; we have to recognize ways of creating incentives, both positive and negative--social bribery and tax systems work out pretty well in this regard--to alter the signals facing individual users of a resource when trying to bring about change or to sustain a reasonable relationship between agriculture and other communities. We need to find ways to alter those signals in ways that will help agriculture do what is reasonable and economically rational, while being good citizens at the same time.

In conclusion, in my mind there is no doubt that agriculture and farming are more important in the U.S. now than they have ever been. Even with fewer farmers, there are more people in agriculture, and it's of greater economic value. People out there know that intuitively. They understand that. Farmers do, in fact, have a responsibility for the future, and consumers do as well. The challenge is to enhance the quality of the interchange there so that expectations can be in line with reality.

In my view, it is not just nice, but absolutely essential that farmers and the agricultural establishment, including the land-grant universities, learn to be better citizens in the broader community. I'm not pointing fingers; I'm not saying we haven't worked at it, but I think we have a long way to go. We have absolutely no assurance of a productive future or any future, for that matter, as agriculturists if we remain aloof and above the process. We must become more active in the process. I'm including colleges of agriculture, committees of Congress and other parts of the agricultural establishment. We must make a deliberate effort to become a more integral part of this complex society.

Thank you.

DENNIS R. HENDERSON: Thank you very much, Larry. We're now going to open the floor to questions and general discussion.

QUESTION: Anyone can answer this. Mr. Russell raised the issue that if program participation is shifted because of budgetary restraints, so that fewer and fewer farmers participate in the program, how do we keep the policy goal of programs? How do we maintain that influence if fewer and fewer of them are participating in the program because the balance of business is not in their favor?

RANDY RUSSELL : You raise a very good point. In the future, you will find that some of the stronger supporters of maintaining farm program spending at the levels that they are at today, which is roughly \$10 billion, will be the environmental community. I am not sure they strongly support things like the conservation reserve program, where we are spending roughly \$2 billion a year to take 36.5 million acres out of production. I do think you'll find them to be ironically the strong supporters of it. But I think that flies in the face of fiscal realities. I just honestly believe that over the course of the next 7 or 8 years we'll probably have two or three more whacks at deficit reduction during that period. Couple that with the fact that we have a series of conservation requirements that are already attached to the program--swamp buster, sod buster, conservation compliance, and then any additional environmental restrictions that are tied in on the 1995 farm bill. I think the result will be that it will leave us in a situation with the vast majority of the commercial family farmers outside the programs. That really leaves no other choice than to use regulation to achieve those kind of purposes. The carrot will be lost, and I'm afraid that the stick will then become the mechanism whereby farmers will be forced to comply, if indeed that's the wave of the future.

DOUGLAS P. WHEELER: I'm not so sure that I would agree with such a gloomy assessment, at least based on our experience in California. It is certainly true that there has emerged a social contract with regard to subsidies and other payments by government to farmers in which the public had some expectation of reciprocal benefit. And therefore, we had concern for swamp buster, sod buster and conservation compliance. That contract is broken if the benefits are not provided, quite obviously, and you would see the diminution of the use of that device. But rather than see regulation take its place, I suspect you'll see, as we're beginning to see in California, the kind of cooperative and voluntary participation and problem solving which obviates the necessity for regulation. We, all of us, have come to realize as Larry has pointed out that regulation establishes an adversarial relationship; it becomes unduly burdensome; and probably most important, fails to achieve the public objective. So when we set about to establish a water bank in California, with participation of farmers being absolutely essential to its success, we did so without the benefit of any new law, without the benefit of regulation, but on the strength of a new bond of trust between the conservation community which has been arguing that we ought to use market-based mechanisms to allocate this important resource, and the agricultural community, which was prepared, I think quite generously, to give it a try. And to the surprise of everyone at the end of the year, we'd survived the sixth year of a drought, we'd built some very important working relationships between agriculture and conservation, and we had done it without the benefit of an additional single regulation or law at the state level.

DENNIS R. HENDERSON: It strikes me that one of the policy issues may be how we create the property rights to allow the market solutions to play themselves out.

DOUGLAS P. WHEELER: You have to recognize those property rights, indeed, as we now do to protect agricultural land across the country. If society suggests that it is in the general public interest to protect agricultural land, as indeed we believe it is, we have to compensate the farmer for any development potential foregone, and most of the development rights programs again are not regulatory programs; they are voluntary compensatory programs.

QUESTION: I have a question for Mr. Libby, and any other panelists who might wish to comment it. If I noted accurately, I believe you made a statement to the effect that the worst situation is to try and use scientists or sciences, particularly those of land-grant universities, to defend the position of farmers. Now I've always been of the opinion that analyzing questions by the scientific method comes about as close to reaching the truth as you can come on issues in question. Are you saying that by doing this the scientist isn't in a position to deal with the truth on issues? Do we have bad science? We shouldn't have science? What exactly do you mean?

LAWRENCE LIBBY: My view on that matter is that absolutely we must provide the basis for making sound decisions based on good science, and that information must be made available and must be brought to the kind of forum where it can make a difference, make it digestible. One of the problems is a lot of science is so mysterious that it doesn't lend itself very well to decision processes. But I have too often seen with one discipline or another the tendency of people in agriculture to simply use a scientist or two or use a particular study as a kind of shield, as a way of bludgeoning people who may have legitimate public concerns about the safety of food, for example. In doing this they close their minds and senses to the effort by citizens to voice a legitimate concern. Using a particular study or a particular individual as sort of a friend of a discipline, whether it's animal science or poultry science or horticulture, whatever it might be, I think, is a dangerous strategy, and it doesn't work. Citizens and consumers are not dissuaded by that, and if something isn't done to create the context and use that information successfully and effectively, then you don't accomplish the purpose. I just think it's misused.

DENNIS R. HENDERSON: Comments from any of the other panelists?

QUESTION: Mr. Moseley mentioned that one of the thoughts he had while being out there on that real good thinking spot, the tractor, was that the farmers' concern that we might not be able to feed the world is a lost concern now. I wonder if he thought about why that would be the case; perhaps farmers now have a more competitive view of the world.

JAMES R. MOSELEY: Well, I'm not exactly sure where you want to go with that, but I think as you look back historically there was a tremendous interest in this whole issue of being able to feed the world 15 to 20 years ago, and that has seemed

to go by the wayside. And yet when we look at it in the longer term perspective here, we've got a potential at least for a population boom in 40 to 50 years. If that's going to happen, we farmers believe morally that we have a responsibility to feed the world and how are we going to carry that out? As I look where we have to go and the amount of food that we have to produce in the next 30 to 40 years, we have to look at science as the basis for our trust, and I guess I don't see any other option to that. That contrasts somewhat with the view that questioned science's credibility, although I think we probably agree more than we realize. I think the point was there's a difference between trusting a science and worrying about whether it's misused or not.

QUESTION: My name is Elvin Hollon, and I work for Associated Milk Producers, Inc. One of the things I find interestingly absent from this session and from the makeup of the podium is that there is no one from the regulatory side of USDA, so my question is addressed to the Unknown Soldier. From my industry's perspective, and I can't help think there are others in the room, one of the problems we have in meeting some of the changes that you have identified is that the regulatory side of USDA, which is important to agriculture, moves so slowly and is so cumbersome. Again, some of the people I worked with were beginning to think that part of the job description for anybody coming to work on that side is FDA experience, and so I wonder if any of you might address that--how can we move ahead in the regulatory side of the business? I don't think voting all the regulations out or doing away with them is the answer.

RANDY RUSSELL: One comment I would have is that several months ago President Bush put in a regulatory moratorium which at the time I must admit I questioned, but very honestly, I think it proved to be very, very effective, because it, for the first time, forced agencies to almost go back to a zero-based budgeting concept where you will look at the need and the effectiveness of various regulations that were pending; look at the costs that were associated with the industries they will be affecting. I think it forced many individuals in the agencies that are regulatory in nature to do some of these things for the first time. I would hope that we will not see an increase in regulation in the next administration. Unfortunately, I think that's exactly what we're going to see. I think that when the height of regulation occurred in 1980, the last year of the Carter Administration. I think we had something like 87,000 pages in the Federal Register. I think when President Reagan was in, he got down to a low point of about 59,000 pages. Here in the last year of the Bush administration, I think it was up close to about 67,000 pages. I would venture to say that the next administration, trying to appease some of the constituencies that helped to get them into office, will regulate, and I think we'll be seeing an increase in regulation, and I think you're going to find that to hamper business, growth and prosperity.

DENNIS R. HENDERSON: This concludes the time we have available for this session. Won't you join me in thanking our distinguished panelists for their help and comments.

Outlook '93

For Release: Tuesday, December 1, 1992

LONGER TERM PROSPECTS FOR THE U.S. AGRICULTURAL SECTOR

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I. Introduction

Good afternoon! I appreciate the opportunity to talk with you today about the longer term outlook for U.S. agriculture. The Program Committee's plans for this session call for me to look broadly across the sector and for Don Mitchell and Vernon Ruttan to follow with more detailed perspectives on economic growth and productivity.

Let me start with a few housekeeping chores. First, I've defined the longer term as roughly the next decade, using 2005 as an arbitrary end point. This is far enough ahead to abstract from the current situation but close enough to hold decision-makers' attention. Second, I've defined agriculture narrowly to focus on the production and distribution of basic commodities. I've also limited discussion of international developments to the minimum necessary to address the outlook for U.S. trade. This simplifies my assignment but leaves important domestic and foreign marketing issues unaddressed.

Third, I'll avoid detailed numerical projections and focus instead on broad supply and demand fundamentals. Fourth, I'll use USDA's interagency projections as a reference point but I'll draw as much as possible on projections done at FAPRI, the World Bank, and the OECD as well. What I want to leave you with today is a feel for their common sense of a sector facing:

- some tightening in the balance between its capacity to produce and market demand for its products related to faster growth in exports and industrial uses combined with slower growth in input use and productivity;
- continued government withdrawal from the sector working to mute any upward pressure on returns due to this tighter balance. This leaves the sector far more dependent on but also more responsive to market forces; and
- nominal gains but real losses in the sector's overall income and finance position.

This implies added financial pressure on the less efficient producer but strong, competitive returns for efficient producers.

I'll close highlighting uncertainties. With this road map in mind, let me begin.

II. A Common Projections Paradigm

Projections work has become a growth industry over the last decade. Many organizations involved in food and agriculture are devoting more resources to longer term planning using economic projections as a starting point. But while the number of projections studies is on the rise, few provide the depth and breadth of the four cited in Chart 1. All four also provide both the basis to do scenario analysis--to answer the intriguing "but what if..." questions.

However, the studies differ enough on important specifics to make comparisons difficult. The USDA and FAPRI projections emphasize U.S. agriculture and the numerical detail needed to support public policy making and program management as well as private sector decision making. The World Bank and OECD studies take on the international nature of these two organizations and focus heavily on the world market and key importing and exporting countries. All four studies use different mixes of formal mathematical models, trend analyses, and expert judgement. All incorporate exogenous assumptions about developments outside the agricultural sector but draw their specific assumptions from different sources. These differences tend to obscure agreement on fundamentals.

Looking beyond these differences, however, all four studies share the same basic supply and demand paradigm. All agree, implicitly or explicitly, that the longer term outlook for

Chart 1. Major Agricultural Projections Studies

- USDA, August, 1992 Baseline Projections
 - Food and Agricultural Policy Institute, March, 1992 FAPRI Baseline Briefing Paper
 - World Bank, August, 1992 Agricultural Prospects
 - Organization for Economic Cooperation and Development, March, 1992 Agricultural Monitoring and Outlook Report
-

U.S. agriculture--and the world commodity markets linked to it--**depends on the changing balance between the sector's expanding capacity to produce and growth in market demand for its products.**

If we adopt this simplistic paradigm, we can abstract from study details and focus on:

- **resources, inputs, and productivity** as the major factors shaping agriculture's changing capacity to produce;
- developments in the traditional **food, feed, and fiber markets** and the emerging **market for industrial products** in the U.S. and the **export market** as the major demand factors; and
- the changing role of **agricultural policy** and **market pressures** in striking the balance.

III. U.S. Agriculture's Changing Capacity to Produce

All four studies agree that U.S. agriculture starts off the 1990's with considerably more capacity to produce than needed to meet market demand. Moreover, they all agree that trends in **resource** and **input use** and **productivity** will work to expand capacity over the next decade and a half.

Chart 2 uses data from the USDA Baseline to emphasize these resource, input, and productivity points. The Chart indicates that, even after adjusting for the lower quality of the acreage in question, the U.S. is currently idling 10-15% of its cropland base and 6-8% of the sector's proven capacity to produce crop and livestock products.

The data in Chart 2 also indicate that the natural resources committed to agriculture have been and are likely to continue to be relatively fixed. Despite wide swings in prices and generally declining real returns, the U.S. cropland base has been stable for several decades. Acreage movement in and out of retirement programs and shifts between cropping and pasture have been the major sources of change.

None of the studies--particularly the detailed USDA and FAPRI studies--project any significant change in these patterns. Yes, problems with water supply, concern about sustainability, and losses to urbanization could generate changes in land use at the regional level, but with little impact at the national level. Both studies recognize that another 30-40 million acres could readily be added to the cropland base, but only if returns rose sharply enough on a sustained basis to spark investment in development. All four studies suggested this is unlikely. Conversely, given the high and fixed cost of

Chart 2. Key U.S. Capacity Indicators

Supply Factors	-----Actual-----					----- Projected 2005 -----	
	1970	1975	1980	1985	1990	Hypothetical Full Capacity Utilization <u>1/</u>	USDA Projected Capacity Utilization ^{2/}
Cropland (mil. acres)	355	333	346	373	365	365	365
Planted (mil. acres)	298	333	346	342	319	365	340
Idled (mil. acres)	57	0	0	31	46	---	25
Purchased Inputs (1977=100)	87	90	106	97	97	105	100
All-Factor Productivity (1977=100)	87	99	107	124	132	163	165
Agricultural Output (1977=100)	84	95	104	118	116	155	145

1/ Assumes that the cropland base does not change and is fully planted; that growth in input use is negligible and is linked to bringing all idled acreage back into use; and that productivity grows at 1.65% per year.

2/ Assumes acreage reduction programs continue to be used to manage supply; that growth in input use is negligible and is linked to bringing 21 million idled acres back into use; and that productivity grows at 1.75% per year.

cropland and limited alternative uses, farmers are projected to continue using all of their 365 million acres unless a sharp, sustained drop in returns sparks abandonment. This was also judged highly unlikely.

The data in Chart 2 also suggest that productivity growth has been and will continue to be the major source of growth in U.S. capacity. The USDA and FAPRI studies both recognize this and the Bank and OECD studies, while they treat the question in considerably less detail, agree. There is less agreement, however, on projecting specific productivity growth rates due at least in part to the changing role of productivity-enhancing manufactured inputs.

Developments in the 1980's worked first to weaken but ultimately to reinforce

expectations about the pace of productivity growth. Strong growth in the use of purchased inputs--particularly manufactured inputs such as fertilizers and pesticides--was an integral part of post-war technology advances, productivity growth, and capacity increases through the 1970's. However, use of these inputs lagged in the 1980's and dropped off 10% by the end of the decade. This led many analysts to expect slower growth in productivity--possibly even productivity reversals. Productivity continued to grow in the 1980's, however, as farmers improved input use, the quality of inputs rose, and new less input-dependent technologies were adopted. This worked in turn to quiet some, but not all, of the speculation that trend productivity increases were not sustainable without continued increases in input use.

The USDA and FAPRI studies reflect this experience. Both studies project negligible growth in input use; with less acreage idled and more planted as participation in farm programs weakens toward 2005, input use per acre is projected to be roughly constant. However, the mix of manufactured inputs is expected to continue changing. Using fertilizers as an example, triple phosphates are projected to continue replacing simple phosphates, anhydrous ammonia and nitrogen solutions replace ammonium nitrate, and use of mixes such as diammonium phosphate increases.

Both studies expect that these improvements in input quality, better farm management, and the adoption of less input-intensive technologies will continue to increase productivity in the trend range of 1.5-2% per year. Aggregating the individual crop and livestock projections included in the USDA and FAPRI studies suggest sector-wide productivity increases of 1.75% per year through 2005. Using USDA's crop yield projections as a reference point, this translates into 41, 140, and 38 bushel yields for wheat, corn, and soybeans compared with current trend levels of 38, 122, and 35 bushels per acre.

What do these resource, input, and productivity factors suggest regarding U.S. agriculture's capacity to produce?

A relatively fixed resource base, slow growth in and more efficient use of improved inputs, and growth in productivity near trend suggest that U.S. agriculture's capacity to produce will grow an additional 30-35% by 2005. Adding this growth to the capacity currently being idled suggests a sector fully using its historical acreage base could produce 35-40% more product in 2005. Moreover, if companion post-war trends in prices and returns hold, this increase in capacity would be compatible with slowly declining real commodity prices and constant to slowly declining real incomes.

IV. Demand Drivers: Domestic Use and Exports

All four studies envision demand for farm products in 2005 depending on developments

in the traditional domestic market for food, feed, and fiber; the expanding domestic market for agriculture-based industrial products; and the export market. These components currently account for 70%, 5%, and 25% respectively of the total market for U.S. farm products. **What do the studies project for these market components?**

There is agreement in the detailed USDA and FAPRI studies that the **domestic market for food, feed, and fiber** will grow slowly in tandem with population gains (Chart 3). Income growth and concern about food safety and nutrition will affect these markets but increasingly through shifts in product mixes. As important as these shifts will be for specific subsectors--such as red meats, dairy, fruits, and vegetables--they are unlikely to add significantly to overall demand. Hence, growth is expected to be less than one and a half percent annually, or possibly 25% in total from 1990 through 2005. The more aggregated OECD and World Bank projections are consistent with this estimate.

Treatment of the **expanding market for industrial uses** varies widely across the studies. USDA projections are the most detailed and envision strong gains due to several factors. Public policy and economics are expected to work in combination to increase demand for cleaner energy and cheaper raw materials from agriculture. This assumes more environmental legislation such as the Clean Air Act will support growth in the use of products such as ethanol. It also assumes that broader technical advances will improve the mechanics of conversion at the same time that the rising real petroleum prices projected in all four studies encourage industry to look to agriculture for a lower cost, readily available feed stock.

Using the USDA corn projections as a reference point, demand in this segment of the market is projected to increase 50% by 2005 but from a small 1990 base. The FAPRI study also projects faster growth in industrial uses while the World Bank and OECD demand projections look at food, feed, fiber, and industrial uses as components of a single domestic market.

The **export component of the market** has long been the most difficult to project and is likely to continue to be the largest potential source of demand growth. All four studies agree that the outlook for the world market and U.S. exports depends on reviving growth in demand for farm products in a broad range of food-deficit countries. Contrary to popular perception, the downturn in world trade and U.S. exports of the 1980's related far more to slowed growth in domestic demand and, in turn, in import demand in the major food-deficit countries than to any general upturn in their supply or in the other exporting countries--other than the EC. The EC's sharp increase in export subsidization in the world wheat, beef, and dairy markets worked to exacerbate the downturn for the other exporters, particularly the U.S.

Chart 3. Key U.S. Agricultural Demand Indicators

	1970	1975	1980	1985	1990	2005
Domestic Use						
Population Growth (%)	1.2	1.0	1.2	1.0	1.1	1.0
Per Capita Disposable Income Growth (%)	3.4	2.5	2.1	1.6	1.5	1.8
Per Capita Food Consumption (1984=100)	99	98	99	104	105	108
Industrial Uses (Corn/bil.bu.)	95	108	163	433	540	850
Exports (mil. m. tons)	49	78	134	102	100	140

While far from bullish, the four studies all project some improvement in demand growth, with the World Bank and OECD providing the most extensive treatment of the issue. The studies look for a gradual but marked improvement in the world economy and increased economic activity in a widening circle of countries (such as Mexico) to raise food demand--in many cases faster than their domestic agricultures can meet (Chart 4). Sustained economic growth in the smaller circle of countries that prospered in the 1980's (such as Korea and Thailand) and further growth in reforming countries (such as China) are projected to reinforce this trend.

With this domestic demand growth spilling over into the import market, world trade is expected to grow twice as fast over the late 1990's and early 2000's as in the 1980's. The projection studies also recognized that the trade and agricultural policy reforms in importing countries provided for in a new GATT accord would also work to expand import demand. A new accord would lower existing internal supports and import restrictions and, potentially even more important, prevent future growth in protectionism in countries that currently have little or no support in place.

While the change is less dramatic, the studies also look for some slower growth in export availabilities in key suppliers such as the EC. This was originally linked to expectations that the burden of CAP price supports and export subsidies would lead eventually to unilateral liberalization of Community agricultural and trade policy. Recent successes at

Chart 4. Economic Growth Projections

Economic Growth (%)	1970's	1980's	1991-95	1996-2000	2001-2005
DC's	4.0	2.7	2.5	2.7	2.8
LDC's	6.0	3.5	4.9	5.4	5.5
Mexico	6.5	2.0	5.1	5.6	5.5
Korea	9.0	8.5	8.1	6.1	7.0
Thai	6.5	7.5	8.3	6.8	7.5
China	5.5	8.5	7.0	7.3	7.1
Former USSR	3.5	2.5	-4.0	3.0	3.0

the GATT negotiations reinforce this view. The GATT reforms under discussion would make CAP budget costs much more visible, restrict overall levels of support, and expand the Community's options for managing its agricultural economy without disrupting the world market with large-scale export subsidization.

All four studies expect this combination of stronger import demand and export supply adjustments to improve U.S. sales substantially. The four projection studies see the unilateral liberalization mandated in the U.S.'s 1990 Food, Agriculture, Conservation, and Trade Act working to price U.S. bulk products more competitively and put pressure on the other suppliers. This leads to a rise in U.S. export volume of 40% by 2005 using the USDA projections as a reference point. This compares with a near tripling of U.S. export volume in the 1970's but a 25% loss in export volume in the 1980's.

What does a composite of these domestic and export markets imply for growth in overall demand for U.S. farm products? Using USDA projections as a reference point, growth in these three market segments would generate slightly more than a 30% increase in total demand for U.S. farm products by 2005.

V. Balancing Capacity and Demand: Agricultural Policy Assumptions

How do prospective growth in capacity and demand balance? Somewhat faster growth in demand tends to narrow the sector's longstanding excess capacity gap. But even with

Chart 5. Extending 1990 Legislation to 2005

	1970	1975	1980	1985	1990	2005
Corn Price/Income Supports						
Loan Rate (nominal \$/bu.)	1.05	1.10	2.25	2.55	1.57	1.84
(1990 \$/bu.)	3.28	2.44	2.46	3.04	1.57	1.15
Target Price (nominal \$/bu.)	--	1.38	2.35	3.03	2.75	2.75
(1990 \$/bu.)	--	3.06	3.61	3.60	2.75	1.75
Actual/Projected Yield (bu/ac.)	72	86	91	118	119	139
Program Yield (bu/ac.)	78	84	93	102	105	105
Total Acreage Idled (mil. acres)	57	0	0	31	46	21
Total Farm Program Outlays						
(nominal \$ bil.)	3.7	.8	1.3	7.7	9.3	3.1
(1990 \$ bil.)	11.6	1.8	2.0	9.2	9.3	2.0

continued trend declines in real prices and incomes discouraging production and encouraging demand, the supply and demand developments projected in all four studies suggest that the sector faces continued--albeit declining--problems with excess capacity.

This projection of a persistent excess capacity problem of possibly 5-10% has to be qualified in economic terms. Excess capacity cannot exist over time in a market economy without policy intervention to slow or prevent resource adjustments. U.S. agricultural policy has worked over most of the post-war period to maintain excess capacity by supporting commodity prices and producer incomes above market clearing levels. This worked to slow--sometimes to halt--the exit of surplus resources. In the setting projected here, the extent the public is willing to continue intervening to support prices and incomes and how support is structured will determine whether market forces eliminate the imbalance or if the excess resources in question are held in the sector.

The four projection studies recognize the pivotal role agricultural policies--particularly price and income support programs and trade and resource programs--will play in this environment. The USDA and FAPRI studies included very specific policy and program

assumptions while the OECD and Bank studies treat the issue in more general terms. However, all four assumed that the direction laid out in the 1990 Food, Agriculture, Conservation, and Trade Act and related budget guidance would continue. The Act kept much of the traditional agricultural policy framework but mandated gradual reductions in price and income support levels and reduced funding for trade and resource programs that gradually move government largely out of agriculture.

Chart 5 emphasizes this reduction in **price and income supports** using corn as an example. The corn loan rate gradually slips further and further below open market prices; the margin between target prices held constant in nominal terms and open market prices also narrows sharply. By 2005, loan rates have fallen more than 25% in real terms while real target prices slip 35%. Moreover, the payment acreage and program yield provisions built into the 1990 legislation reduce support further by limiting the production eligible for payments. Annual acreage reduction programs are still authorized and all four studies project their continuation--albeit at much lower levels--to 2005 and beyond. The 1990 legislation also makes an added 15% of base acreage ineligible for income support. Deficiency payments are also calculated using a frozen program yield of 105 bushels per acre which, with actual yields projected at 140 bushels per acre, means a fourth of production from even eligible acres is ineligible for income support.

Combining all of these factors suggests government payments in 2005 to a prototypical 500 acre corn farm fully enrolled in the acreage reduction program would be 35% lower in nominal terms and 60 percent lower in real terms. Adjustments for the other major field crops (i.e., wheat, the other feed grains, cotton, and rice) are similar in magnitude. And milk supports face similar pressures.

The more detailed policy assumptions included in the USDA and FAPRI projections also provide for less support for the sector through trade and conservation programs. Even before progress was made in GATT talks, the USDA and FAPRI projections assumed that nominal funding for the **export programs** would be constant at best. This translates into a real decline of roughly one-third by 2005. This reflects several factors including expectations that export promotion programs will not be needed as much in the middle and late 1990's if growth in U.S. exports picks up and if progress is made in reaching an export subsidy accord with the competitors, particularly the EC. This assumption also reflects the 1990 Act's general move toward less government intervention and the broader concerns about budget constraints also contributing to cut backs at work in the price and income support area.

Outlays for **conservation programs** are also projected to lag in nominal terms and to drop off sharply in real terms toward the end of the period. CRP contracts come due and are not renewed. This also reflects several factors. Conservation program activity

has been strongest historically when justified in both environmental and supply management terms. By the end of the projections period, the supply management payoff on conservation has dropped off sharply. The sector's supply management needs are appreciably smaller. Only 20 million acres are being idled by 2005 in the USDA study. Given normal year-to-year swings in yields due to weather, it's conceivable that the full acreage base could be needed in a particular year toward the end of the period to offset a poor crop. And annual acreage reduction programs offer far more flexibility in meeting this temporary need than conservation programs that typically involve multi-year contracts and costly start-up and on-going rental payments. In this setting, conservation programs tend to contract and even nominal program outlays drop off beyond 2000.

But while significantly lower, public support for the sector is still high enough to prevent the full adjustments needed to bring the sector's capacity to produce into balance with market demand. The USDA and FAPRI budget projections still call for net transfers to the sector in the \$3 billion range compared with \$9 in 1990 and \$26 billion in 1987. In real terms, support in 2005 falls to \$2 billion.

VI. Implications for Sector Performance...

Chart 6 summarizes the income and finance projections and reflects this mix of declining government support and persistent problems with excess capacity. With more product marketed as output increases and nominal prices rise, cash receipts increase steadily over the projections period. Continued, albeit declining, government payments help to boost farm income. With expenses rising somewhat slower than receipts, net farm income also rises each year. However, the pace is significantly slower than inflation. This translates nominal income gains into real losses. By 2005, real income levels are 20% below 1990 levels.

The finance indicators reflect these same market pressures. While appreciating in nominal terms, assets erode in real terms. Debt increases slowly in nominal terms and falls sharply in real terms as the market setting discourages capital investment. Equity rises in nominal terms but even declining real debt is not enough to keep real equity levels from eroding. In short, with gradually eroding program support, agriculture faces significant market pressure even though its capacity to produce and market demand for its products are moving into closer balance than over most of the post-war period.

How much further would income and finance measures slip without government support? The \$3 billion in payments projected for 2005 understates the full extent of support given the ancillary impact of trade and resource programs. The financial indicators also reflect some residual public support in the sense that some of the risk involved in agriculture is still offset by farm programs. Hence, while the government isn't complete out of

Chart 6. Income and Finance Implications

	1970	1975	1980	1985	1990	2005
Gross Receipts (\$ bil.)	51	89	140	144	170	230
Government Payments (\$ bil.)	4	1	1	8	9	3
Cash Income (\$ bil.)	54	91	143	158	186	245
Cash Expenses (\$ bil.)	36	61	109	110	125	171
Net Cash Income (\$/bil.)	18	30	34	47	62	74
(1990 \$/bi.)	50	59	46	49	55	42
Debt (\$/bil.)	53	92	179	188	145	190
Assets (\$ bil.)	324	579	1,089	893	996	1,340
Equity (\$/bil.)	272	488	911	705	851	1,150
(1990 \$/bi.)	850	1,085	1,400	905	851	730

agriculture and some minimal excess capacity is still being held in agriculture, the sector is close to completing the transition to a market economy.

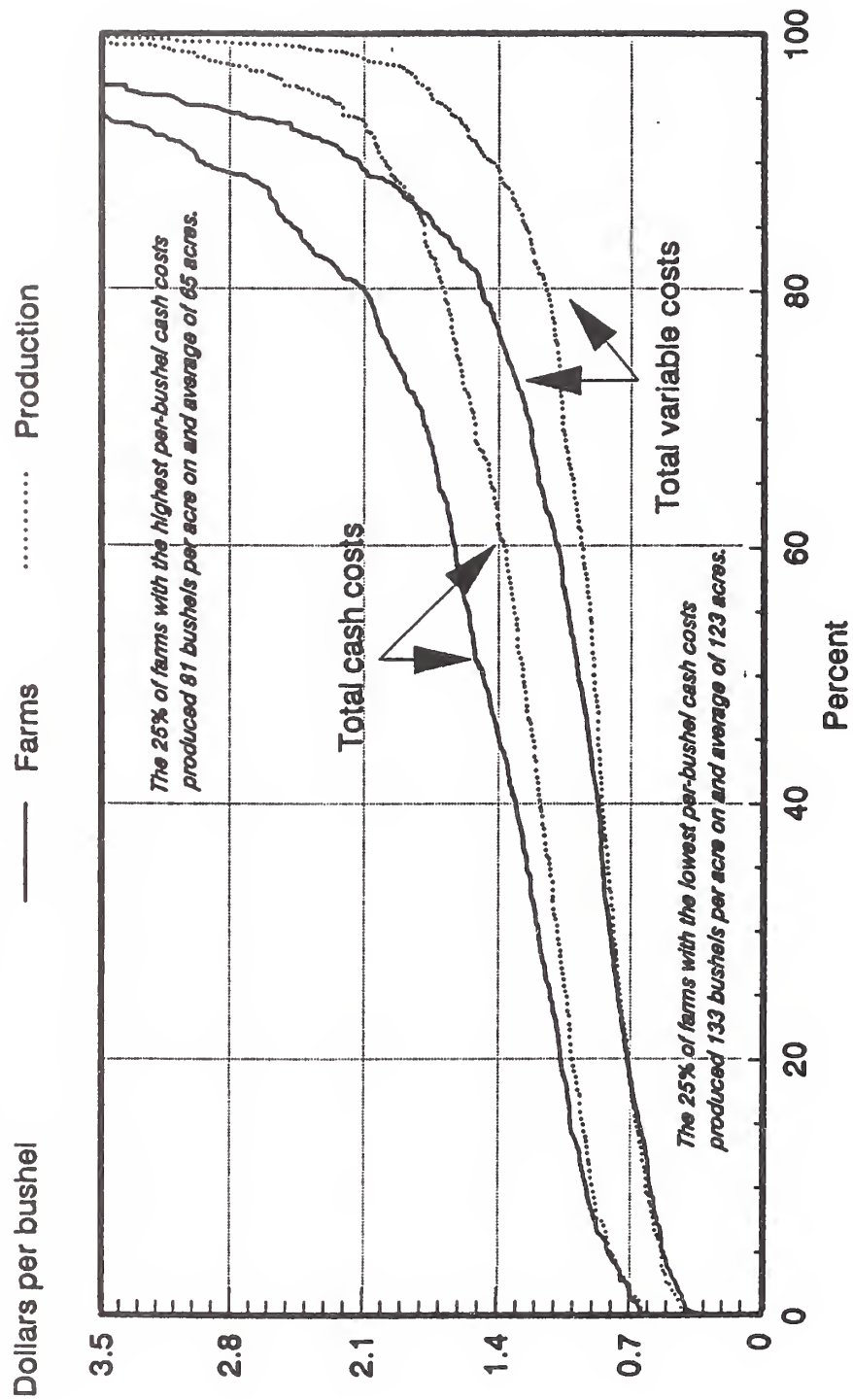
Are these projections internally consistent? How do we relate declining real commodity prices and incomes to expansion in capacity and output? Using Chart 7's information on corn costs of production provides a graphic framework. The projections imply that this cost curve will move out to the right as new technology is adopted and productivity gains are made. Increases in the cost of production will work simultaneously to push the curve to the left. Reduced supports will push in the same direction. This makes sense only if, as the chart suggests, we start off with a highly profitable enterprise that can weather these adjustments and has little alternative uses for its resources.

VII. Caveats

Long-term projections are of limited value, no matter how strong the consensus, without a sense of possible shocks to the system. All four studies recognize weather as a critical uncertainty but are forced to assume normal weather in the absence of any better alternative. The studies also point to two common areas of concern--economic and environmental concerns about the sustainability of our technology base and trade

Chart 7.

Corn: Cumulative distribution of total cash and variable costs of production per bushel, 1987



concerns about developments in Eastern Europe and the former Soviet Union as well as in the developing countries.

Economic and Environmental Concerns About the Technology Base...

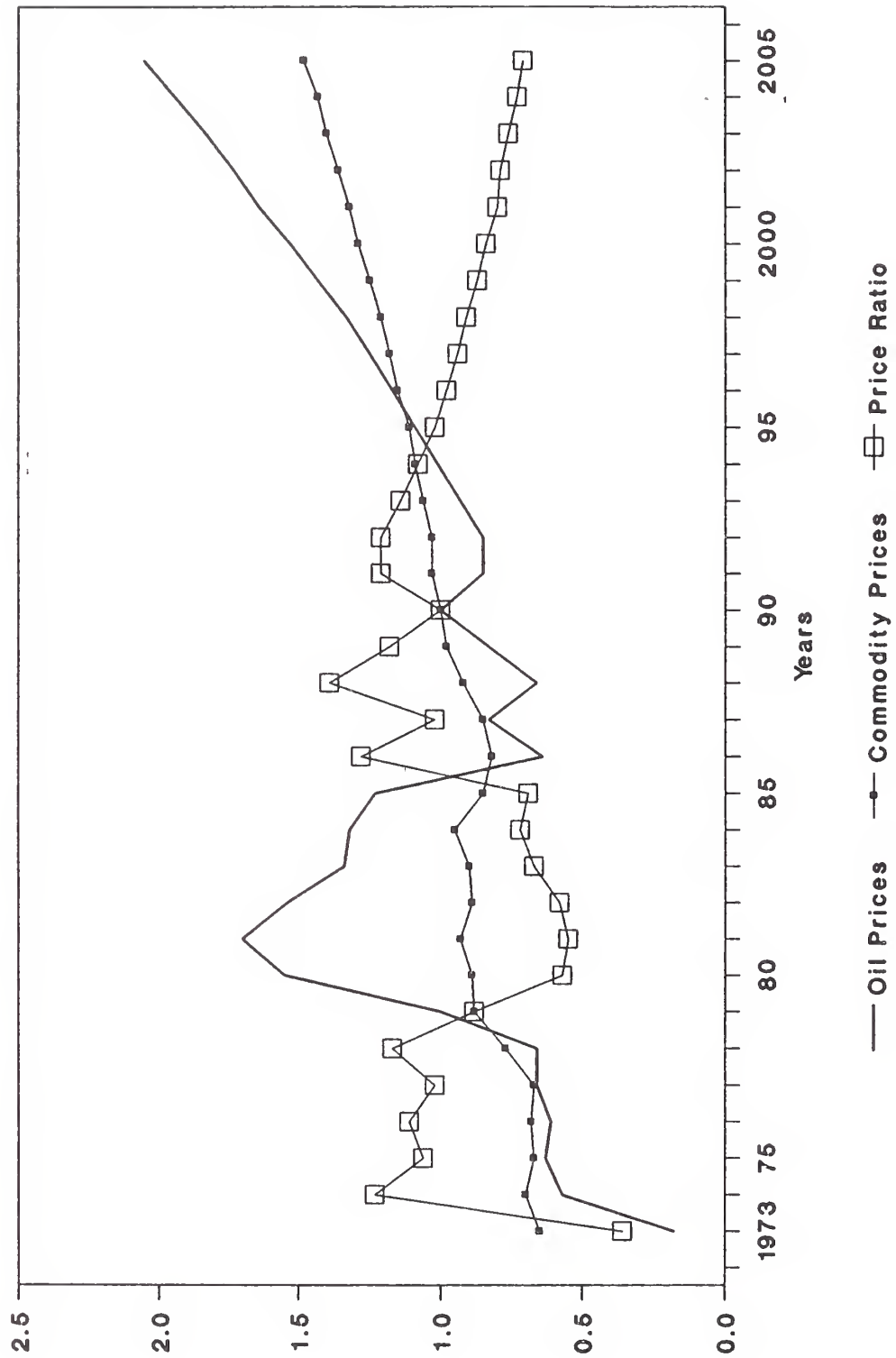
With the natural resources committed to agriculture relatively fixed in both the U.S. and abroad, future growth in supply will continue to depend heavily on productivity growth. The link between productivity growth and use of petroleum-based inputs such as fertilizers and pesticides is changing in some of the more advanced agricultural economies, but continued high levels of input use will be critical in maintaining output. Moreover, input use in the developing countries will have to more than double by 2005 if the production increases projected in the World Bank and OECD studies are to be realized. This raises two questions--one economic and the other environmental in nature.

In economic terms, will the supply and price of petroleum continue to favor its expanding use in agricultural production? As Chart 8 indicates, the relationship between petroleum prices and commodity prices has generally favored increasing use of fertilizers and pesticides despite input-output relationships that trade off several calories of fossil fuel energy to produce a single food energy calorie. But all four studies point to tighter supplies and gradually rising real petroleum prices that could work through this technology link to slow growth in supply.

Questions about the environmental impact of a petroleum-based agricultural technology are equally troublesome. Using fertilizer use as a proxy, that input intensity in the United States is high but well below levels in Western European and selected East Asian countries. Even with an extensive land and water base and intermediate levels of use, large areas of the U.S. face the risk of ground water contamination. This risk has to be significantly higher in countries with more limited land and water bases, higher input use levels, and farmers with more limited management skills.

These environmental concerns could combine with economic pressure to make a petroleum-based agricultural technology increasingly obsolete. In the best of worlds, these pressures will lead to more efficient use of the inputs in question and the accelerated development and adoption of alternative technologies--some of which are already in place in U.S. agriculture. In a less ideal world, the transition would not be as smooth as assumed in the four projection studies and result in slower growth in supply and higher environmental costs. Given the U.S.'s resource base and its lead in new technology development and adoption, a "bumpier" transition would work to expand export demand for U.S. products faster than projected here, ease the excess capacity problem faster, and position the sector to attract rather than lose resources early in the next century.

Chart 8.
Oil and Commodity Prices
Index 1990 = 100



Trade Concerns About Eastern Europe/Former Soviet Union and Open Markets...

The gradually strengthening world market for farm products envisioned in all four studies could well fail to materialize depending on how events in Eastern Europe and the former Soviet Union unfold. Many of the Eastern European countries are well endowed resource-wise and have advanced Western European technology and market incentives to draw on in their efforts to boost agricultural output, displace imports, and sell on the world market. The former Soviet Union faces more daunting challenges, but increased market reforms are working to encourage more efficient production and use of farm products and to reduce dependence on imports.

The four projection studies are optimistic in that they project a slow, orderly reform effort in this bloc leading to gradually reduced import demand and limited increases in export availabilities. While less probable, more successful reform efforts in these countries--or possibly the total collapse of their economies--would have a far more bearish impact on the world market than projected and tighten competition for the increased market share projected for the United States.

All four projection studies also agree implicitly or explicitly on the importance of import access. While GATT talks have focused heavily on export subsidies and competition with the EC, import access could become as critical in the late 1990's. Strong growth in demand for farm products in the rapidly growing developing countries does not translate into imports unless their markets are open. Insuring this access will be difficult if developing countries follow the pattern of countries like Japan and invest part of their new-found affluence in farm subsidies that ultimately depend on import restrictions to keep budget costs down. As Chart 9 indicates using internal Japanese and world market prices for rice, there has been a strong correlation between growth in income and increases in protectionism. Should this relationship continue, the import growth projected in all four studies could fail to materialize.

Given the importance of export growth, either of these two trade scenarios would tend to extend the excess capacity problem in the U.S., leave the sector far more dependent on government support and less market-oriented, and keep budget outlays higher lower than projected here.

VIII. Conclusion

What common sense of direction do the studies share? They point to:

- some tightening in the balance between agriculture's capacity to produce and market demand for its products;

- continued government withdrawal from the sector working--somewhat counter-intuitively--to mute any upward pressure on returns despite this tighter balance. This leaves the sector far more dependent on market forces but also more able to respond to market signals; and
- nominal gains but real losses in the sector's overall income and finance position. This implies added financial pressure on the less efficient producer but strong, competitive returns for efficient producers.

The studies also share common economic and environmental concerns about the sustainability of our technology base and trade concerns about market access in the rapidly growing developing countries and the effects of reform on Soviet and Eastern European import demand and export availabilities.

INTERNAL RICE PRICE MINUS WORLD PRICE LEVELS OF SUBSIDIZATION

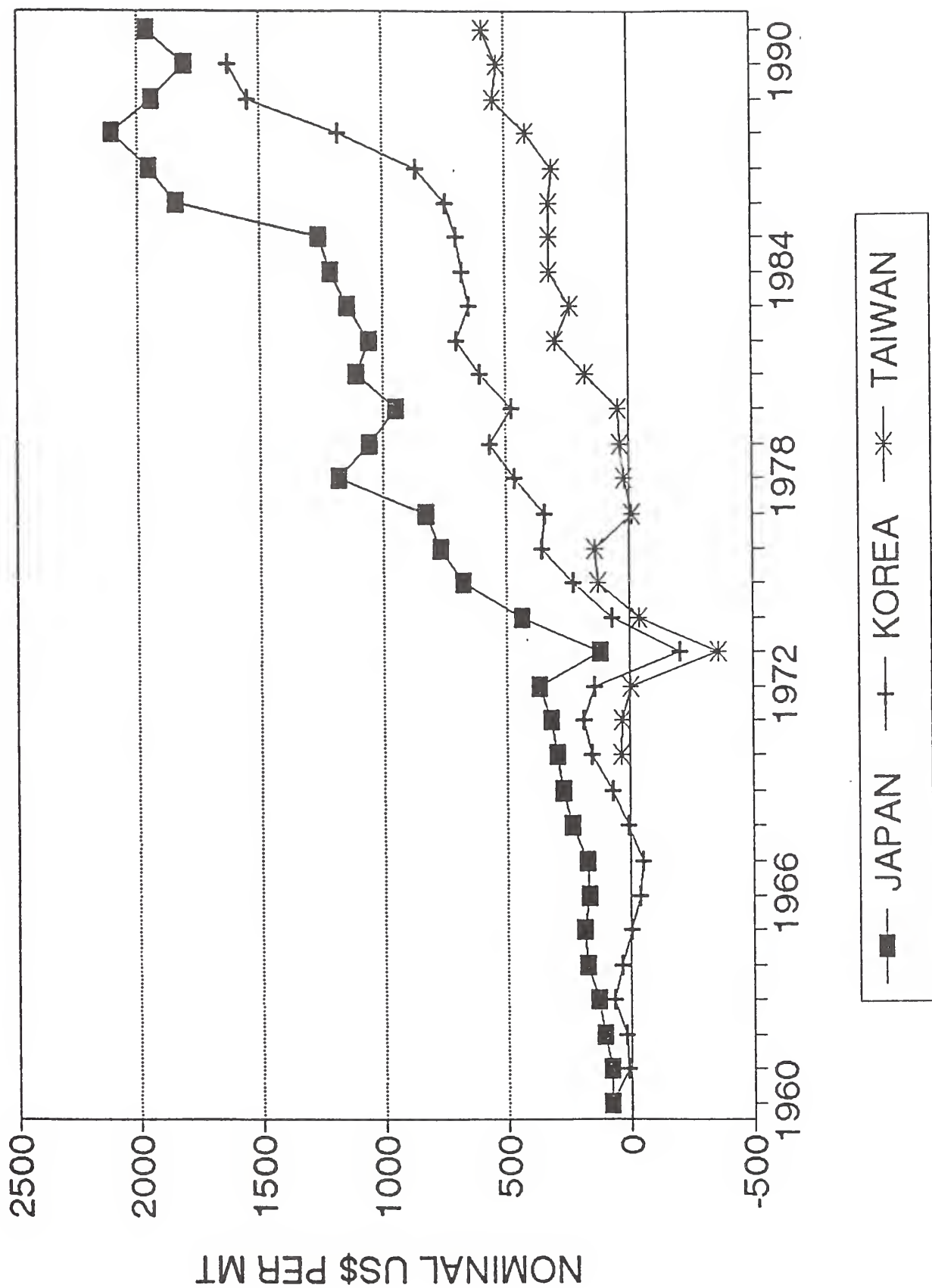


Chart 9a.

**Income Levels and Agricultural
Protectionism**

County	Per Capita Income (1986-88)	Producer Subsidy Equivalent (1982-89)
Japan	\$16,000	+ 70
EC	\$10,900	+ 35
South Korea	\$2,950	+ 80
Brazil	\$1,950	+ 20
Mexico	\$1,900	+ 30
Chile	\$1,440	+ 25
Nigeria	\$535	-15
Pakistan	\$340	-20
China	\$325	-35
India	\$310	-10

Outlook '93

For Release: Tuesday, December 1, 1992

WORLD MACROECONOMIC PERFORMANCE AND AGRICULTURAL TRADE¹

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The long term prospects for agricultural trade depend on many factors, but world macroeconomic performance is certainly one of the most important. World grain trade, which is the largest part of agricultural trade, about doubled during the 1970s from 110 million tons in 1970 to 216 million tons in 1980. From 1980 to 1990, it averaged 204 million tons (USDA, 1992). This stagnation in trade was partially caused by slow income growth--especially for developing countries. Real per capita GDP in developing countries grew at only 1.2 percent per annum during the 1980s, compared to 3 percent during the 1970s (World Bank, 1992).

What can we expect during the balance of the 1990s? I believe that the macroeconomic conditions in the developing countries and in the FSU and Eastern Europe will be major determinants of the growth of grain trade during the decade. The prospects are diverging for the two groups, however. While the prospects for GDP growth appear good for the majority of developing countries, the prospects for the FSU and Eastern Europe are not nearly as bright.

The Situation in the Developing Countries

Let's begin with a few facts:

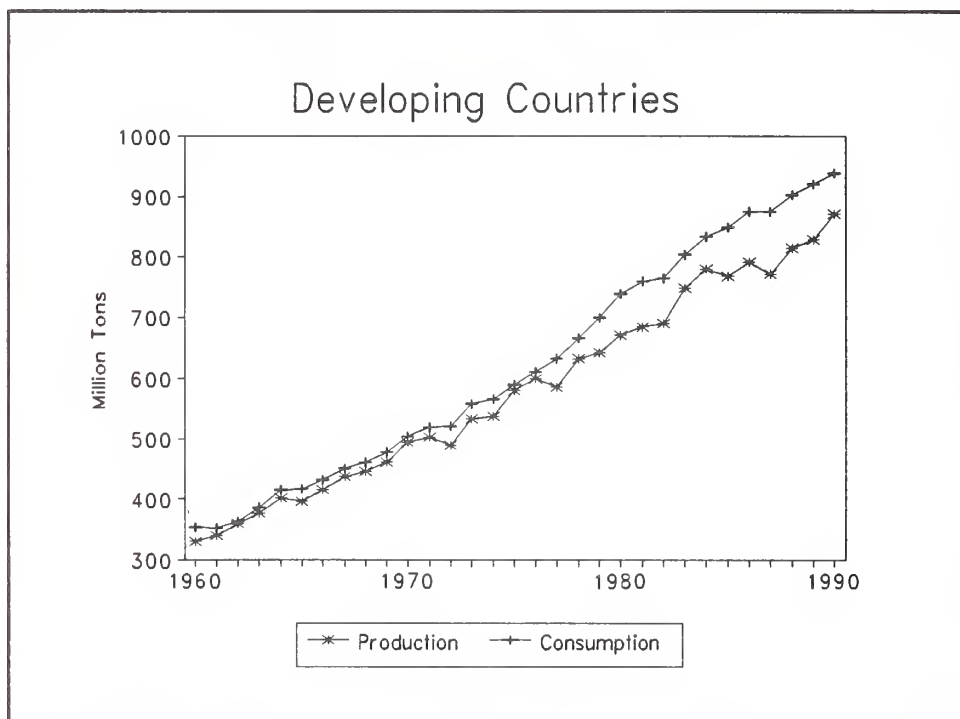
- approximately 77 percent of the world's population live in developing countries;
- the growth of population is nearly four times as fast in the developing countries as in the industrial countries;
- the growth of incomes is nearly twice as fast in the developing countries as in the industrial countries;
- and the income elasticity for food is probably two to three times as large in the developing countries as in the industrial countries.

¹ The views expressed in the paper are those of the author and do not necessarily reflect those of the World Bank, its Executive Board, or its member countries.

Given this background, we must look to the developing countries as the most likely source of future growth in agricultural trade.

If we look at the trends in total grain production and consumption in developing countries (see Figure 1), we see a widening gap since about 1970. The gap narrowed during the early 1980s as production surged ahead due to good weather, policy reforms and lower fertilizer and energy prices. This resulted in reduced grain imports and was a major factor contributing to the stock buildup in the industrial countries. Since the early 1980s, the gap has widened again.

Figure 1. Developing Countries Grain Production and Consumption, 1960-90



Source: World Bank, International Economics Department

Accompanying this widening gap are changes in the composition of grains consumed. Countries which have traditionally consumed rice as the basic staple have been switching to wheat to add variety to their diets, and countries which have maize as their staple cereal (as in Africa and parts of Latin America) are switching to wheat and rice. A shift towards increased consumption of meats, dairy products, vegetable oils, fruits and vegetables is

also taking place. Along with the increased meat and dairy products consumption goes increased feed grain demand. The share of grain consumption used for feed in developing countries has more than doubled since 1970, from 8.6 percent in 1970 to 18.6 percent in 1990. The main influence behind this set of related trends is increasing per capita incomes, with the most dramatic increases taking place in Asia.

Table 1 shows the growth in real per capita GDP in developing country regions during the past three decades and projections for the 1990s. GDP growth slowed dramatically during the 1980s compared to the previous two decades. Sub-Saharan Africa, Latin America, and the Middle East and North Africa had negative growth during the 1980s, while Eastern Europe and Asia had positive growth. Many factors led to the slower growth including high foreign debt, a severe world recession during the early 1980s, declining oil revenues for some, and poor policy choices for others--especially in Africa.

Table 1. Growth of Real Per Capita GDP, Developing Countries

	1960-70	1970-80	1980-90	Projected 1990-2000
	(average annual percentage change)			
All Developing	3.3	3.0	1.2	2.9
Sub-Saharan Africa	.6	.9	-.9	.3
East Asia	3.6	4.6	6.3	5.7
South Asia	1.4	1.1	3.1	3.1
Latin America	2.5	3.1	-.5	2.2
Middle East & N. Africa	6.0	3.1	-2.5	1.6
Eastern Europe	5.2	5.4	.9	1.6

Source: World Bank, "Global Economic Prospects and the Developing Countries," International Economics Department, April 1992

East Asian developing countries increased real GDP per capita by more than 6 percent per annum in the 1980s and South Asian developing countries grew at more than 3 percent. In both cases this was substantially faster than during earlier periods and more rapid than for other developing countries. Particularly rapid growth occurred in China (nearly 9 percent) during the 1980s, while India grew at nearly 4 percent, Pakistan at 3.5 percent, and Thailand at 4.5 percent per annum.

The projections for real per capita income growth during the 1990s for the developing countries are for a return to historical growth rates of near 3 percent per annum. Industrial countries are projected to have moderate growth rates in real per capita GDP of about 2.0 percent per annum. Asia will most likely continue to have the most rapid growth, but all regions are expected to return to positive growth. These forecasts may be viewed as optimistic, however, they are supported by improved debt positions in developing countries, significant economic restructuring in countries such as those in Eastern Europe, and by policy reforms such as those taken in Latin America. Expanded exports of manufactures by the developing countries, particularly in Asia, are also expected to support more rapid growth during the 1990s.

It is heartening that good economic prospects appear to be in store for a large part of the world's poor. Asia contains nearly 59 percent of the world's population (see Figure 2). Africa contains about 12.1 percent, Latin America 8.5 percent, Europe 9.4 percent, the FSU 5.4 percent, North America 5.4 percent, and Oceania 0.5 percent. Population growth rates have been most rapid in Africa at near 3 percent per annum while Latin America is increasing at 2.1 percent and Asia at 1.8 percent (see Figure 3).

Rapid population growth combined with rapid income growth, place Asia at the top of the list of prospective buyers of agricultural products. If we look at historical trends in grain production and consumption, we see that Asia has been a major importer of grains for some time now.

The gap between grain consumption and production has steadily increased in East Asia (see Figure 4). In 1989-91, grain net imports were 23 million tons compared to 9 million tons in 1969-71. The largest gap, however, is in North African and Middle East region which has increased net grain imports from 9 million tons in 1969-71 to 42 million tons in 1989-91 (see Figure 4). Latin America has also increased net grain imports steadily over the years as shown (see Figure 4). Central African countries have increased imports more slowly than most other regions due to severe income constraints. Imports by South Asian countries have been modest. But import growth occurred despite exceptionally rapid growth in agricultural output of more than 3 percent per annum. Demand grew even more rapidly, reflecting changing consumption patterns as well as increased direct consumption of cereals. Given their recent strong income growth and good growth prospects it seems reasonable to ask whether the South Asia region will be next to experience a rapid increase in grain imports.

Figure 2. Distribution of World Population by Region

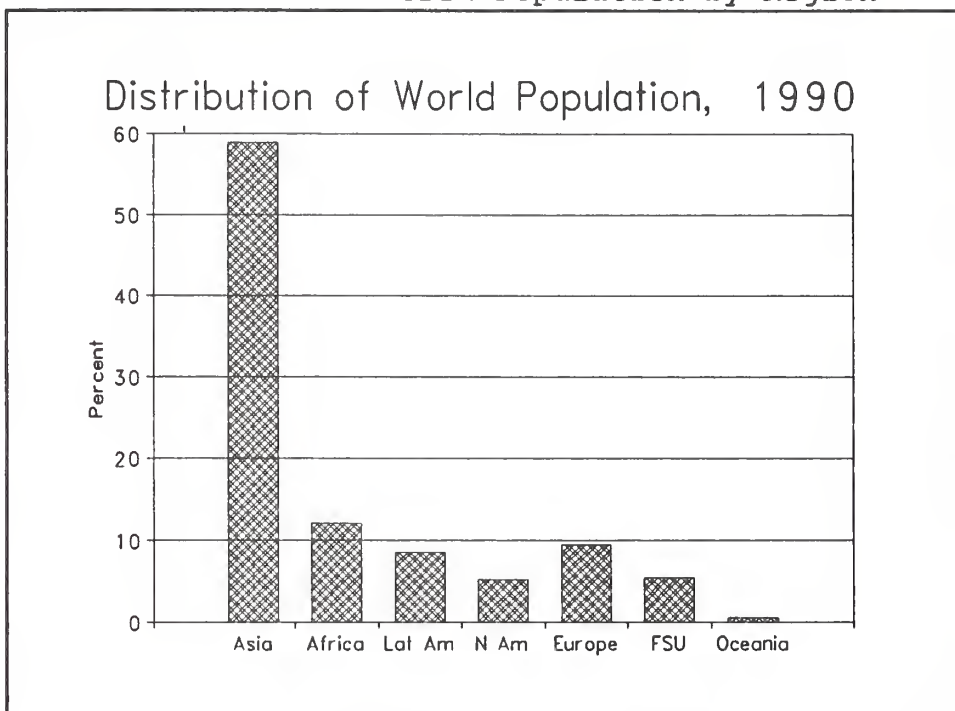
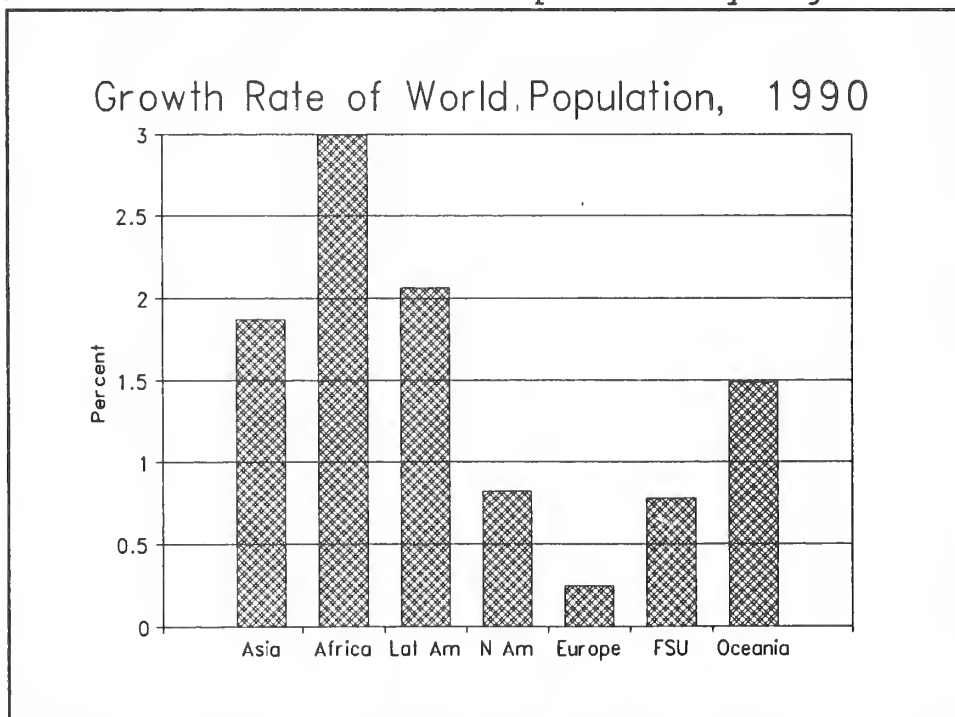
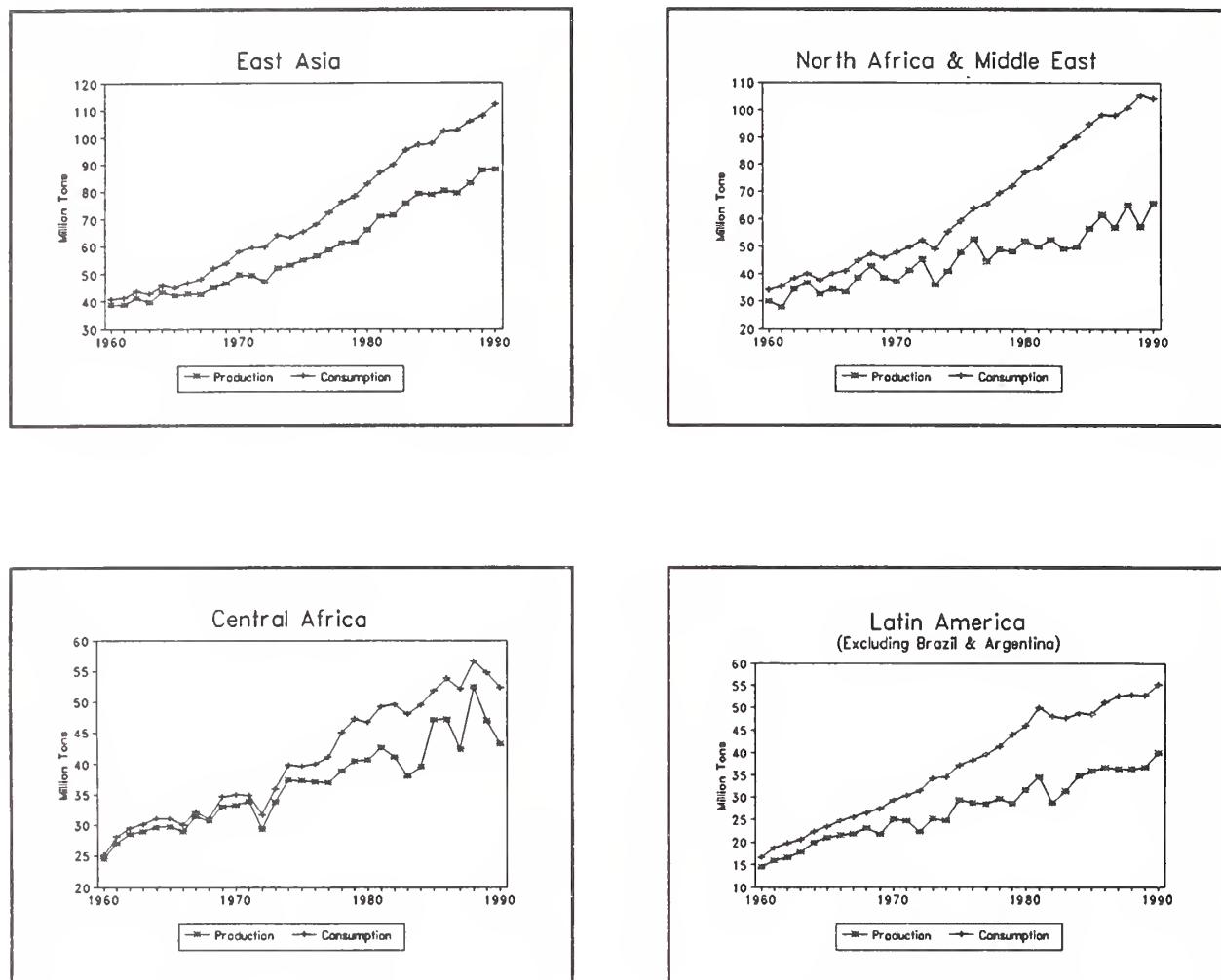


Figure 3. Growth Rates of World Population by Region



Source: United Nations, "World Population Prospects, 1990"

Figure 4. Developing Countries Grain Production and Consumption by Region, 1960-90



Source: World Bank, International Economics Department

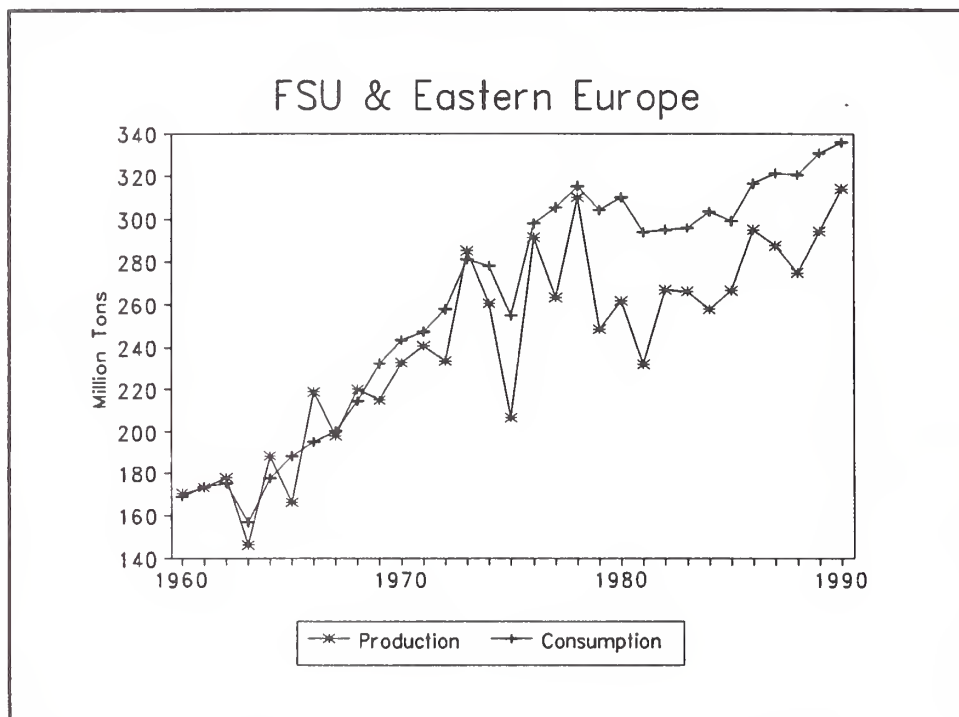
A second trend which is emerging in the developing countries, and which has implications for world agricultural trade, is the slowing of the growth of grain production. The World Bank projects total grain production to grow at 2.3 percent per annum over the period to 2000, compared to 2.8 percent from 1970 to 1985 (World Bank, 1992). This change reflects a number of factors which primarily relate to the maturing of the "Green Revolution." Since the first high-yielding varieties were released in 1965, the "Green Revolution" has allowed rice and wheat production to grow faster than population. This was possible because the improved crop varieties were able to yield twice as much as traditional varieties when heavily fertilized and properly irrigated. This technology has now been extended to nearly all the best land and further expansion will be difficult. Investment in new irrigation systems has slowed, and expansion of harvested area is constrained by the availability of suitable land. Consequently, grain production is likely to grow more slowly in the future than during the period since 1965. This will further increase the demand for imports. There is not likely to be any new technology which will have a significant impact on yields within the next decade, although promising research is underway on rice at the International Rice Research Institute (IRRI) in the Philippines and on wheat and maize at CIMMYT in Mexico.

Much of the slowdown in the growth of yields will be felt in Asian rice production. This leads to an interesting question: Will rice imports and prices increase sharply as countries turn to the world market to supplement domestic rice production? In my view this will not be the outcome. Instead, I believe that countries will turn to wheat imports to satisfy domestic demand because wheat prices are typically 50-60 percent of rice prices and because many consumers in developing countries prefer to add wheat-based products to give variety to the diet. Also, wheat is readily available from several major exporting countries. The prospects for rice imports are further complicated by the large number of types and qualities of rice and the difficulty of matching consumer preferences and market supplies.

The Situation in the Former Soviet Union (FSU) and Eastern Europe

The second major group of grain importing countries has been the FSU and Eastern Europe. If we look at total grain production and consumption (see Figure 5), we see production stagnating since the late 1970s--reversing the trend of increased production and consumption since the 1960s. During the early 1980s production declined, placing a heavy burden on imports to maintain consumption. The trend may be changing again as we see production increasing in recent years. During the 1970s and 1980s, these countries accounted for about 20 percent of world imports--with highs of 24 percent in 1981 and 1984 (USDA, 1991).

Figure 5. FSU & Eastern Europe Grain Production and Consumption, 1960-90



Source: World Bank, International Economics Department

The impact on the world's grains markets of the break-up of the Soviet Union into independent Republics could be monumental--perhaps as important as the emergence of the Soviet Union as a major grain importer during the early 1970s. The eventual outcome is uncertain, mostly because of doubts about the success of economic reforms in the various Republics. Many opportunities for increased productivity exist. Crop yields can most likely be increased and yield variability decreased by adopting improved varieties from Europe and the United States. Greater output of meat, milk, and eggs can be obtained by improving the breeding stock and feeding a better balanced ration. More timely planting and harvesting could be possible with better machinery and machinery maintenance. And, better storage and grain handling could reduce post-harvest losses.

In the next few years, it is likely that the FSU will remain a major grain importer, with the actual volume heavily dependent on the availability of credit and assistance from supplying countries. In the long-run, if market economies emerge with private sector agriculture, there seems little doubt that the FSU could emerge as a grain exporter. It is not inconceivable that we could see the region moving from importing about 20 percent of world grain trade

to exporting an equal percentage. On the other hand, if the Republics are not able to make the transition to stable, market-based economies, then imports will remain at whatever levels can be financed and grain prices will not be greatly affected.

It seems likely that the future level of grain imports in the FSU will also be increasingly linked to developments in other sectors. The FSU has huge reserves of oil, natural gas, coal, and timber. If the performance of these sectors improves and traditional exports of oil, gold and raw materials increase, the FSU should be able to maintain its grain imports.

Grain consumption levels in the FSU and Eastern Europe have risen well above other countries with similar demographic and cultural heritages. For example, Eastern Europeans consumed 834 kilograms of grain per person in 1988 compared to 427 kilograms per person by Western Europeans in the EC-10 countries. This difference probably reflects the economic system as well as dietary preferences. A severe lack of consumer goods probably led the government to placate people with large quantities of low-priced food. Also, inefficiencies in harvesting, transport and processing probably caused the per capita consumption figures to overstate the amount actually consumed. As this region implements economic reforms, including world market prices, it seems very likely that consumption patterns will change to more nearly reflect those of Western Europeans. This decline in consumption could further increase the potential for exports.

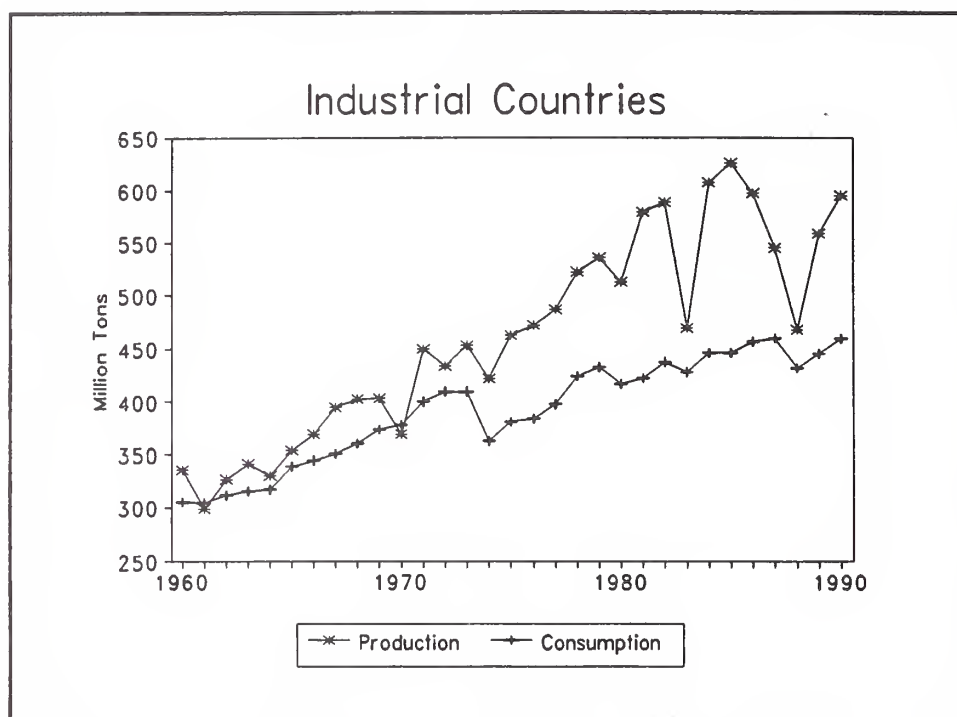
Prospects for Industrial Country Exports

The industrial countries have been the main grain exporters to the developing countries and to the FSU and Eastern Europe(see Figure 6). In the peak production year of 1985, production in industrial countries exceeded consumption by 179 million tons while net exports were only 94 million tons. Since then, production has been curtailed sharply through supply control programs, lower world prices, and droughts.

The prospects for industrial countries' grain exports depend primarily on the trends in developing countries' grain imports, which should continue to rise, and FSU imports, which are expected to fall. While net grain exports are projected to rise more rapidly than during the 1980s they are unlikely to rise at the fast rates of the 1970s.

Considering the net grain imports of these three major country groupings (Table 2), we project an increase of 27 percent in industrial countries' net exports by the year 2000 relative to the 1989-91 average. This projection is based on rising net imports by the developing countries while the FSU and Eastern Europe reduce net grain imports by about 40 percent. We should not place great

Figure 6. Industrial Countries Grain Production and Consumption, 1960-90



Source: World Bank, International Economics Department

Table 2. Grain Net Imports

Region	1960	1970/a	1980/a	1990/a	Projected 2000
(million tons)					
Industrial Countries	-17.4	-28.9	-114.3	-132.4	-168.7
FSU & E Europe	-.7	2.8	48.8	38.6	23.1
Developing Countries	13.4	19.7	62.4	90.4	145.6
Africa, Sub-Saharan	.5	1.8	7.2	7.1	10.7
East Asia & Pacific /b	2.0	9.2	17.1	23.5	36.0
Latin Amer & Car /c	2.2	5.2	15.8	17.1	25.9
Mid East & N Africa	5.0	8.9	26.9	42.0	55.4
South Asia	7.1	5.5	2.0	2.7	16.0

Source: World Bank, International Economics Department

a/ Data are 3 year averages centered on year shown.

b/ Excluding Thailand

c/ Excluding Argentina and Brazil

confidence in these figures since developments in the FSU are very uncertain.

Finally, a comment on grain prices. It seems unlikely that grain prices will rise significantly in real terms during the decade--except in the event of weather-induced production shortfalls. Production capacity in the industrial countries seems more than adequate to meet likely increases in import demand. By the end of the decade, prospects of increased yields in the developing countries due to genetic engineering research and the restructuring of production systems in the FSU and Eastern Europe may begin to temper import demand in both regions.

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Outlook '93

For Release: Tuesday, December 1, 1992

**SUSTAINABLE GROWTH IN AGRICULTURAL PRODUCTION:
INTO THE 21ST CENTURY***

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We are now in the midst of the third wave of social concern since World War II about the implications of natural resource availability and environmental change for the sustainability of improvements in human well being.

The first wave of concern, in the late 1940s and early 1950s, focused primarily on the quantitative relations between resource availability and economic growth. The primary response to this first wave of concern was technical change. The second wave of concern occurred in the late 1960s and early 1970s. The earlier concern with the potential "limits to growth" imposed by natural resource scarcity was supplemented by concern about the capacity of the environment to assimilate the multiple forms of pollution generated by growth. Since the mid-1980s these two earlier concerns have been supplemented by a third. These newer concerns center around the implications for environmental quality, food production, and human health of a series of environmental changes that are occurring on a transnational scale--issues such as global warming, ozone depletion, acid rain, and others.

It is of interest that, with each new wave of the concern, the issues that dominated the earlier wave were recycled. The result is that while the intensity of earlier concerns has receded, in part due to the induced technical and institutional changes, the concerns about the relationships between resource and environmental change and sustainable growth in agricultural production has broadened.

The Agricultural Transformation

We are in the closing years of the 20th century completing one of the most remarkable transitions in the history of agriculture. Prior to this century almost all the increase in food production was obtained by bringing new land into production. There

were only a few exceptions to this generalization--in limited areas of East Asia, the Middle East, and Western Europe.

By the first decade of the next century, almost all of the increases in world food production must come from higher yields--from increased output per hectare. In most of the world the transition from a resource-based to a science-based system of agriculture is occurring within a single century. Most of the countries of the developing world have been caught up in the transition only since mid-century.

Recent historical trends in production and consumption of the major food grains could easily be taken as evidence that one should not be excessively concerned about the capacity of the world's farmers to meet future food demands. World wheat prices, corrected for inflation, have declined since the middle of the last century. Rice prices have declined since the middle of this century. These trends suggest that productivity growth has been able to more than compensate for the rapid growth in demand, particularly during the decades since World War II.

As we look toward the future, however, the sources of productivity growth are not as apparent as they were a quarter century ago. The demands that the developing economies will place on their agricultural producers from population growth and growth in per capita consumption arising out of higher income will be exceedingly high. During the next several decades growth in food and feed demand rising from growth in population and income will run upwards of 4.0 percent per year in many countries. Many will experience more than a doubling of food demand before the end of the second decade of the next century. In this paper I draw on a series of three consultations, organized with the support of the Rockefeller foundation, on the implications of global change for agricultural, environmental and health research agendas.

Biological and Technical Constraints on Crop and Animal Production

The gains in agricultural production required over the next quarter century will be achieved with much greater difficulty than in the immediate past. Difficulty is currently being experienced in raising yield ceilings for the cereal crops which have experienced rapid yield gains in the recent past. The incremental response to increases in fertilizer use has declined. Expansion of irrigated area has become more costly. Maintenance research, the research required to prevent yields from declining, is rising as a share of research effort.

It is possible that within another decade, advances in basic knowledge will create new opportunities for advancing agricultural technology that will reverse the urgency of some of the above concerns. Institutionalization of private sector agricultural research

capacity in some developing countries is beginning to complement public sector capacity. Advances in molecular biology and genetic engineering are occurring rapidly. But the date when these promising advances will be translated into productive technology seems to be receding.

The following general conclusions are from the first consultation on biological and technical constraints on crop and animal productivity.

Advances in conventional technology will remain the primary source of growth in crop and animal production over the next quarter century. Almost all increases in agricultural production over the next several decades must continue to come from further intensification of agricultural production on land that is presently devoted to crop and livestock production. Until well into the second decade of the next century the necessary gains in crop and animal productivity will be generated by improvements from conventional plant and animal breeding and from more intensive and efficient use of technical inputs including chemical fertilizers, pest control chemicals and more effective animal nutrition.

The productivity gains from conventional sources are likely to come in smaller increments than in the past. If they are to be realized, higher plant populations per unit area, new tillage practices, improved pest and disease control, more precise application of plant nutrients, and advances in soil and water management will be required. Gains from these sources will be crop, animal, and location specific. They will require closer articulation between the suppliers and users of new knowledge and new technology. These sources of yield gains will be extremely knowledge and information intensive. If they are to be realized, research and technology transfer efforts in the areas of information and management technology must become increasingly important sources of growth in crop and animal productivity.

Advances in conventional technology will be inadequate to sustain the demands that will be placed on agriculture as we move into the second decade of the next century and beyond. Advances in crop yields have come about primarily by increasing plant populations per hectare and the ratio of grain to straw. Advances in animal feed efficiency have come largely by decreasing the proportion of feed consumed that is devoted to animal maintenance and increasing the proportion used to produce usable animal products. There are severe physiological constraints to continued improvement along these conventional paths. These constraints are most severe in those areas that have already achieved the highest levels of productivity. The impact of these constraints can be measured in terms of declining incremental response to energy inputs--both in the form of a reduction in the incremental yield increases from higher levels of fertilizer application, and a reduction in the incremental savings in labor inputs from the use of larger and more powerful mechanical equipment. If the incremental returns to

agricultural research should also decline it will impose a higher priority on efficiency in the organization of research and on the allocation of research resources.

A re-orientation of the way we organize agricultural research will be necessary in order to realize the opportunities for technical change being opened up by advances in microbiology and biochemistry. Advances in basic science, particularly in molecular biology and biochemistry, have and are continuing to open up new possibilities for supplementing traditional sources of plant and animal productivity growth. A wide range of possibilities, ranging from the transfer of growth hormones into fish to conversion of lignocellulose into edible plant and animal products were discussed at the consultation. The realization of these possibilities will require a reorganization of agricultural research systems. An increasing share of the new knowledge generated by research will reach producers in the form of proprietary products or services. This means that incentives must be created to draw substantially more private sector resources into agricultural research. Within the public sector research organization will have to increasingly move from a "little science" to a "big science" mode of organization. Examples include the Rockefeller Foundation sponsored collaborative research program on the biotechnology of rice and the University of Minnesota program on the biotechnology of maize.

Efforts to institutionalize agricultural research capacity in developing countries must be intensified. Crop and animal productivity levels in most developing countries remain well below the levels that are potentially feasible. Access to the conventional sources of productivity growth--from advances in plant breeding, agronomy, and soil and water management will require the institutionalization of substantial agricultural research capacity for each crop or animal species of economic significance in each agro-climatic region. In a large number of developing countries this capacity is just beginning to be put in place. A number of countries that experienced substantial growth in capacity during the 1960s and 1970s have experienced an erosion of capacity in the 1980s. Countries that do not acquire adequate agricultural research capacity will not be able to meet the demands that they will place on their farmers as a result of growth in population and income.

There is a need for the establishment of substantial basic biological research and training capacity in the tropical developing countries. There are a series of basic biological research agendas that are important for applied research and technology development for agriculture in the tropics that receive, and are likely to continue to receive, inadequate attention in the temperate region developed countries. There is also a need for closer articulation between training in applied science and technology and training in basic biology. The new capacity in biological research will need to be more closely linked with existing academic centers of research and training than the series of agricultural research institutes governed by the Consultative Group on International Agricultural Research (CGIAR).

Resource and Environmental Constraints on Sustainable Growth

A second consultation was held on issues of resource and environmental constraints on agricultural production involving scientists engaged in climate change studies, agricultural scientists and economists. One set of concerns focused on the impact of agricultural production practices that will be employed in those areas which have made the most progress in moving toward highly intensive systems of agriculture production. These include loss of soil resources due to erosion, water-logging and salinization, groundwater contamination from plant nutrients and pesticides, and growing resistance of insects, weeds and pathogens to present methods of control. A second set of concerns stems from the impact of industrialization on global climate and other environmental changes. Four major conclusions emerged from the second consultation.

A serious effort to develop alternative land use, farming systems, and food systems scenarios for the 21st century should be initiated. A clearer picture of the demands that are likely to be placed on agriculture over the next century and of the ways in which agricultural systems might be able to meet such demands has yet to be produced. World population could rise from the present 5 billion level to the 10-20 billion range. The demands that will be placed on agriculture will also depend on the rate of growth of income--particularly in the poor countries where consumers spend a relatively large share of income growth on subsistence--food, clothing, and housing. The resources and technology needed to increase agricultural production by a multiple of 3-6 will depend on both the constraints on resource availability that are likely to emerge and on the rate of advance in knowledge. Advances in knowledge can permit the substitution of more abundance for increasingly scarce resources and reduce the resource constraints on commodity production. Past studies of potential climate change effects on agriculture have given insufficient attention to adaptive change in non-climate parameters. But application of advances in biological and chemical technology, which substitute knowledge for land, and advances in mechanical and engineering technology, which substitute knowledge for labor, have in the past been driven by increasingly favorable access to energy resources--by declining prices of energy. There will be strong incentive, by the early decades of the next century, to improve energy efficiency in agricultural production and utilization.

The capacity to monitor the agricultural sources and impacts of environmental change should be strengthened. Only in the last decade and a half has it been possible to estimate the magnitude and productivity effects of soil loss even in the United States. Even rudimentary data on productivity effects of soil loss is almost completely unavailable in most developing countries. The same point holds, with even greater force, for groundwater pollution, salinization, species loss and others. It is time to design the elements of a comprehensive agriculturally related resource monitoring system and to establish priorities for implementation. Data on the effects of environmental change on the health of individuals and communities is even less adequate. The monitoring should

include a major focus on the effects of environmental change on human populations. Much closer collaboration between production-oriented agricultural scientists, ecologically trained biological scientists, and the physical scientists that have been traditionally concerned with global climate change is essential. This effort should be explicitly linked with the monitoring effects currently being pursued under the auspices of the International Geosphere-Biosphere Programs (IGBP).

The design of technologies and institutions to achieve more efficient management of surface and groundwater resources will become increasingly important. During the next century water resources will become an increasingly serious constraint on agricultural production. Agricultural production is a major source of decline in the quality of both ground and surface water. Limited access to clean and uncontaminated water supply is a major source of disease and poor health in many parts of the developing world and in the centrally planned economies. Global climate change can be expected to have a major differential impact on the water availability, water demand, erosion, salinization, and flooding. The development and introduction of technologies and management systems that enhance water use efficiency represents a high priority both because of short and intermediate run constraints on water availability and the longer run possibility of seasonal and geographical shifts in water availability. The identification, breeding, and introduction of water efficient crops for dryland and saline environments is potentially an important aspect of achieving greater water use efficiency. In agriculture, as in the energy field, there are a number of technical and institutional innovations that could have both economic and environmental benefits. Among the technical possibilities is the design of a new "third" or "fourth" generation chemical, biorational, and biological pest management technologies. Another is the design of land use technologies and institutions that will contribute to reduction of erosion, salinization, and groundwater pollution.

A major research program on incentive compatible institutional design should be initiated. The first research priority is to initiate a large-scale program of research on the design of institutions capable of implementing incentive compatible resource management policies and programs. By incentive compatible institutions I mean institutions capable of achieving compatibility between individual, organizational, and social objectives in resource management. A major source of the global warming and environmental pollution problem is the direct result of the operation of institutions which induce behavior by individuals, and public agencies that are not compatible with societal development--some might say survival--goals. In the absence of more efficient incentive compatible institutional design, the transaction costs involved in ad hoc approaches are likely to be enormous.

Health Constraints on Agricultural Development

The third consultation focused on health constraints on agricultural development. One might very well ask why this topic was included in a series of consultations on agricultural research. Since the mid-1960s a number of commonly used health indicators such as life expectancy and infant mortality experienced substantial improvement for almost all developing countries. Concerns about nutritional deficiency as a source of poor health has receded in a large number of developing countries in the last several decades.

Yet there are a number of other indicators that suggest that health constraints could become increasingly important by the early decades of the next century. Daily calorie intake per capita has been declining for as much as two decades in a number of African countries. While dramatic progress has been made in the control and reduction of losses due to infectious disease and in the control of diarrheal disease little progress has been made in the control of several important parasitic diseases. The sustainability of advances in malaria and tuberculosis control are causing serious concern. The emergence of AIDS, combined with the other health threats, could emerge as a major threat to economic viability in both developed and developing countries. As the environmental impacts of agricultural and industrial intensification become clearer it appears that they are already imposing significant health burdens in some countries, particularly in parts of the USSR, China, and Eastern Europe.

Four priority issues were identified in the third consultation.

The capacity to design systems of health delivery that are capable of reducing the incidence of illness continues to elude health policy and planning agencies in both developed and developing countries. The systems that are in place in most countries can be more accurately described as sickness recovery systems rather than health systems. They are health care rather than health maintenance systems. A major deficiency is the lack of a system for providing families and individuals with the knowledge needed to achieve better health with less reliance on the health care system. The point was made several times during the consultation that many countries have been able to design reasonably effective agricultural extension or technology transfer systems to provide farm people with the knowledge about resources and technology needed to achieve higher levels of productivity. But we have yet to design an effective system to provide families and individuals with the knowledge in the area of human biology, nutrition, and health practice that will enable them to lead more healthy lives.

The residuals produced as a by-product of industrial and agricultural production have become an increasingly important source of illness in a number of countries and regions. The most serious impacts are occurring in the centrally planned economies of Eastern Europe, the USSR and China. Levels of atmospheric, water and soil pollution have resulted in higher mortality rates and reductions in life expectancy. The effects are evident in the form of congenital malformation, pulmonary malfunction and excessive

heavy metals in soils and in crops grown on contaminated soils. Many of the health effects of agricultural and industrial intensification are due to inadequate investment in the technology needed to control or manage contaminants. Rapid industrial growth in poor countries, in which investment resources are severely limited, will continue to be accompanied by underinvestment in the technology needed to limit the release of contaminants. The situation that exists in Eastern Europe presents a vision of the future for many newly industrializing countries unless better technology can be made available and more effective management of environmental spillover effects can be implemented.

Lack of location specific or site-specific research capacity represent a major constraint on the capacity of health systems in most developing countries. It is no longer possible to maintain the position that health related research results can simply be transferred from developed country research laboratories or pharmaceutical companies to practice in developing countries. Local capacity is needed for the identification and analyses of the sources of health problems. It is also needed for the analysis, design and testing of health delivery systems. The international donor community has been much slower in supporting the development of health research systems than agricultural research systems in the tropics. For example, there is now in place a network of more than a dozen international agricultural research centers (IARC's), sponsored by the Consultative Group on International Agricultural Research that play an important role in backstopping national agricultural research efforts. The only comparable international supported center in the field of health is the Diarrheal Research Center in Bangladesh. Furthermore the capacity to conduct research on tropical infectious and parasite diseases that was supported by the former colonial countries - United Kingdom, France, Netherlands and Belgium - has been allowed to atrophy.

More effective bridges must be built, both in research and in practice between the agricultural and health communities. At present these two "tribes", along with veterinary medicine and public health, occupy separate and often mutually hostile "island empires". But solutions to the problem of sustainable growth in agricultural production and improvement in the health of rural people and the consumers of agricultural commodities requires that each of these communities establish bridgeheads in the others territory. Multi-purpose water resource development projects have contributed to the spread of onchocerciasis. Successful efforts to control the black fly have reopened productive lands to cultivation. The introduction of improved cultivars and fertilization practices have helped make the productivity growth sustainable. But examples of effective collaboration either in research, or in project development are difficult to come by.

Perspective

My own perspective on agricultural futures is cautiously optimistic. The challenges posed by the constraints on crop and animal productivity and by the resource,

environmental and health constraints on sustainability should not be interpreted as a completely pessimistic assessment. The global agricultural research system, the technology supply industry, and farmers are much better equipped to confront the challenges of the future than they were when confronted with the food crises of the past.

It cannot be emphasized too strongly, however, that the challenges are both technical and institutional. The great institutional innovation of the 19th century was "the invention of the method of invention." The modern industrial research laboratory, the agricultural experiment station, and the research university were a product of this institutional innovation. But it was not until well after mid-century that national and international agricultural research institutions became firmly established in most developing countries. The challenge to institutional innovation in the next century will be to design the institutions that can ameliorate the negative spillover into the soil, the water, and the atmosphere of the residuals from agricultural and industrial intensification.

The capacity to achieve sustainable growth in agricultural production and income will also depend on the changes that occur in the economic environment in which developing country farmers find themselves. The most favorable economic environment for releasing the constraints on crop and animal productivity and for achieving sustainable adaptation to the resource and environmental constraints that will impinge on LDC agriculture is one characterized by slow growth of population and by rapid growth of income and employment in the nonagricultural sector. Failure to achieve sustainable growth in the non-farm sector could place developing country farmers in a situation in which they can make adequate food and fiber available to the non-farm sector only at higher and higher prices--reversing the long-term trend--but in which the resources available to generate the investments in resource and technology development necessary to sustain growth are inadequate.

The importance of favorable growth in the non-farm economy is particularly important for the landless and near landless workers in the rain-fed upland areas which have been left behind by the advances associated with the seed-fertilizer-water technology of the last quarter century. Rapid growth in demand arising out of higher incomes, rather than from rapid population growth, can generate patterns of demand that permit farmers in these areas to diversify out of staple cereal production and into higher value crop and animal products. It may also permit the release of some of the more fragile lands from crop production to less intensive forms of land use.

*Earlier drafts of this paper have been published in Journal of Asian Economics (Fall, 1990) 189-204; Canadian Journal of Agricultural Economics 39 (1991), p. 567-580; Outlook on Agriculture 20 (#4, 1991), pp. 225-234; Choices (3rd Quarter, 1992), pp. 32-37; Robert M. White (ed.), Technology and Economics (Washington, DC: National Academy Press, 1991), pp. 85-105; Philip G. Pardy, Johannes Roseboom and Jock R. Anderson (eds.), Agricultural Research Policy: International Quantitative Perspectives (Cambridge: Cambridge University Press, 1991), pp. 399-411; Natsuki Kanazawa (ed.), Southeast Asian Agriculture and Japan (Tokyo: Nihon University Regional Research Institute of Agriculture in the Pacific Basin, 1991), pp. 81-98; Ariel Dinar and David Zilberman (eds.) The Economics and Management of Water and Drainage in Agriculture (Boston: Kluwer Academic Publishers, 1991), pp. 903-912.

Outlook '93

For Release: Tuesday, December 1, 1992

GROWING MARKETS FOR VALUE-ADDED FARM PRODUCTS

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Global agricultural trade, excluding EC intra-trade, grew \$38 billion between 1980 and 1990. But global trade in grains, oilseeds, cotton, and tobacco -- traditionally the root of U.S. export strength -- fell \$5 billion. Growth has been in other products. Similarly, these traditional products now account for less than half the value of U.S. agricultural exports.

The goal of this presentation is to explore the nature of these non-traditional exports; to describe their characteristics, to highlight the product sectors and markets driving their rapid growth, and to summarize the extent of USDA efforts to promote U.S. exports of these products. This presentation will hopefully tell you what U.S. exports of these products are doing, while the two speakers to follow will give you some of their insights as to why the markets are changing and how U.S. exporters can take advantage of these changes.

DEFINITIONS

However, before we can discuss developments in value-added farm exports we must define what it is exactly we are talking about since there are varying definitions of what constitutes a value-added product.

The first issue we must address is what constitutes an agricultural product. That is, in the production of non-food products derived from agricultural goods, at what point in the processing chain does the product cease to be considered an agricultural product.

Generally, we consider all food derived from farm products as agricultural, as well as all other goods derived from farm products that do not go beyond a

"primary" level of processing. Thus, cattle hides are agricultural, but leather and leather goods are not. Similarly, distillation adds sufficient processing to alcoholic beverages such that distilled liquors are generally not considered agricultural, nor are tobacco products such as cigarettes. While fishery products (processed) are included in processed foods (as are distilled liquors), they are not generally considered agricultural products.

Once we have decided what constitutes an agricultural product, the simplest disaggregation of agricultural exports is into two groups: e.g., bulk and high-value, or raw and processed. In the first case the distinction is the degree of value-added; in the second case the distinction is the degree of physical transformation. However, there are numerous farm products that do not fit neatly into one group or the other. In addition, the definitions of bulk, raw, high-value, or processed often vary depending on the purpose of the analysis and other terms with similar meanings are frequently used.

Let's look at some of these variations.

Traditional exports are generally described as bulk goods. Unprocessed grains and soybeans are exported in large quantities using much of the same infrastructure used to ship non-food bulk products, such as iron ore and cement. Their value per ton is low, they have had no further processing since harvest, they are generic, readily substitutable, and traded in open, auction markets. Cotton and tobacco share many of these characteristics, although not all. Tobacco's high per-ton value and post-harvest handling in particular differentiate it from other bulk products, and some studies have excluded it from bulk. Also, fresh fruits and vegetables undergo very little processing after leaving the farm, but for many analytical purposes you would not want to treat them in the same way as bulk commodities.

Raw agricultural products, like bulk, include commodities that are not physically transformed after moving beyond the farm gate. Sorting and specialized transportation do not alter a product's designation as being raw, but may create enough value-added to put the product in the high-value products category. Again, fresh produce is the most prominent example.

High-value products (HVP's) are simply defined as all non-bulk commodities. They are distinct from bulk products because generally a greater share of their export value has been added after harvest than is the case for bulk products. HVP's additional value-added after the farmgate is the result of processing, handling and sorting, or specialized transportation. The term "value-added" product is often used interchangeably with "high-value" product. However, not all value-added products would necessarily be considered high-value products. Some high-value products have lower per unit values than their bulk predecessors, e.g. soybean meal. Also, the term "high-value" may not always be associated with semi-processed products such as tallow, wheat flour or compound feeds that have been substantially transformed, but must still be further processed before reaching consumers.

Processed agricultural products are defined as those that have been physically transformed. They are often products of the food processing industry. However, the food processing industry has two major outputs, fishery products and distilled alcoholic beverages, that are not considered agricultural products.

With all of these varying definitions, the basic question is: "Which definition is appropriate?". The answer: "It depends on what it is you are trying to analyze." Differing analytical purposes will require the use of different definitions.

For example, employment analysis frequently relies on the distinction between the Raw and Processed Food categories. The usefulness of this distinction is that it corresponds to a single, recognizable industry group.

In export marketing analysis, it is most useful to disaggregate products by the type of buyers at which marketing efforts are aimed. In its export marketing analysis, the Foreign Agricultural Service (FAS) uses a further refined version of the Bulk vs. High-Value distinction wherein the High-value category is further sub-divided into intermediate products and consumer-oriented products. The distinction reflects the differing types of buyers and marketing activities necessary for market development within the High-value category.

Intermediate products are those such as flour, oilseed meal, and cattle hides which only reach final consumers after substantial transformation: e.g., flour will be transformed into bakery products, oilseed meal will be fed to livestock, and hides processed into leather goods. The buyers are usually manufacturers of further processed products and market development activities require targeting these types of buyers in order to expand demand for your products.

Consumer-oriented goods are roughly in the form that they will reach final consumers: e.g., fresh and processed produce, bakery goods, highly processed foods, dairy products and meat. Market promotion activities for these will be aimed mostly at consumers.

Given that the focus of this session is on capturing the growth markets for value-added products, the data and information I'm about to present will be categorized according to these three sub-divisions -- bulk, intermediate, and consumer-oriented. However, when I speak of value-added or high-value products, I'm referring to intermediate and consumer-oriented together.

The major types of products in each of the three categories can be summarized as follows:

BULK	INTERMEDIATE	CONSUMER-ORIENTED
Wheat	Wheat Flour	Bakery products
Coarse Grains	Soybean Meal	Beef
Rice	Soybean Oil	Pork
Soybeans	Other Vegetable Oil	Offals (Variety Meats)
Cotton	Feeds and Fodders	Poultry Meat
Tobacco	Hides and Skins	Dairy Products
Pulses	Animal Fats	Fresh and Processed Fruit
	Live Animals	Fresh and Processed Vegetables
	Planting Seeds	Fruit and Vegetable Juice
	Hops	Tree Nuts
	Wool	Wine

GLOBAL HIGH-VALUE EXPORTS GROWING

World trade in high-value farm products grew 64 percent in value between 1983 and 1990, the latest year for which global trade figures are available, compared with a 4 percent decline for bulk products during that period. The 5-year outlook for high-value product trade points to an annual increase of 5 to 7 percent in value, compared with projected annual growth of 2 percent for world trade in bulk commodities. The greatest growth in high-value trade is expected in the consumer-oriented sector.

Although the United States is one of the two major exporters of high-value products, the European Community holds a big lead. In 1990, the EC (even excluding internal EC trade) had a 24 percent share of the world market in all high-value products, compared with a 14 percent U.S. share.

The EC's lead is not surprising given its large expenditures on price subsidies and export refunds for highly processed products. These combined EC expenditures amounted to nearly \$1.5 billion in 1990 for fruits, vegetables, wines, and related products (\$786 million for price subsidies and \$662 million for export refunds).

Trade-distorting measures like these are why we have been pushing hard in the Uruguay Round of the GATT negotiations to discipline such measures and bring some order to world agricultural trade.

U.S. HIGH-VALUE EXPORTS ALSO GROWING

As the world market for these products grows, exports of intermediate and consumer-oriented high-value products are increasingly important to U.S. agricultural trade. While U.S. bulk commodity exports have lagged, U.S. high-value exports are setting records. Over the past seven years, U.S. exports of high-value products have doubled in value, reaching \$22.7 billion in fiscal year 1992 -- the sixth consecutive record high. In 1985, these exports totaled \$11.5 billion. During the 1985-92 period, U.S. exports of

bulk farm commodities hit a high point of \$22 billion in fiscal year 1989, then declined in each of the two following years before rebounding to \$19.5 billion in fiscal 1992.

In fact, for the past two fiscal years, U.S. export sales of all high-value products have exceeded our traditional bulk product exports in value. Among U.S. intermediate and consumer-oriented high-value products, some of the leading export groups in fiscal year 1992 were fresh and processed horticultural products at \$7.0 billion, livestock products at \$5.9 billion, feed and fodders at \$2.0 billion, sugar and tropical products at \$1.7 billion, and poultry products at \$1.1 billion.

These exports will be increasingly important to future U.S. agricultural trade. High-value products already dominate world agricultural trade, accounting for an estimated 65 percent of the total value, and this dominance is growing.

U.S. INTERMEDIATE PRODUCT EXPORTS

Exports of U.S. intermediate products have been mostly flat the past couple of years after posting strong gains in the mid-1980's. Sales in fiscal year 1991 dropped for the second straight year, to \$8.5 billion, after rising to \$8.9 billion in 1989. Sales rebounded in fiscal year 1992 to \$9.2 billion, primarily due to a sharp rise in sales of vegetable oil and soybean meal. While these products are unlike bulk commodities because many are processed to some degree, they share many of the same marketing characteristics as bulk commodities in that they largely compete on the basis of price.

Feeds and fodders led the intermediate high-value exports in fiscal year 1992 with a record \$1.7 billion in sales. Hides and skins dropped the most among U.S. intermediate exports, down to \$1.3 billion, compared with \$1.8 billion in 1988, because of reduced U.S. cattle slaughter. Soybean meal exports rebounded strongly in value in fiscal year 1992 to \$1.3 billion, up from \$1.0 billion in 1991.

U.S. CONSUMER-ORIENTED PRODUCT EXPORTS

U.S. Consumer-oriented high-value exports grew to a record \$13.5 billion in fiscal year 1992. This marks the sixth year in a row in which consumer-ready sales reached a new record level with 1993 expected to be yet another new high. Consumer-oriented products accounted for well over half of the 52 percent growth in total agricultural exports between 1987 and 1992.

The largest U.S. exports of consumer-oriented products in fiscal 1992 included red meats (at \$3.2 billion), fresh fruit and vegetables (at \$2.6 billion), and processed fruit and vegetables (at \$1.5 billion). While still relatively small (under \$800 million a year), pet foods, wine and beer, and snack food products have been three of the fastest growing categories of U.S. exports in recent years.

Given the non-volatile nature of these exports, the growth in world demand, and rising incomes and favorable demographics in major markets, these exports are expected to grow by roughly 7-10 percent a year over the next 5 years. This far exceeds the anticipated growth in bulk exports. Products with the best outlook include those which have been growing recently, namely, fruits and vegetables (fresh and processed), red meats, pet foods, wine and beer, and snack foods.

Because of the income sensitive nature of consumer-oriented trade, the largest U.S. markets include Japan, the EC, the newly industrialized countries of Asia (Taiwan, Korea, Singapore, and Hong Kong), and Mexico. Sales to the Asian markets and Mexico have especially benefited from their recent surge in economic growth as well as some liberalization in their import regimes.

GLOBAL MARKET FOR CONSUMER-ORIENTED PRODUCTS

With the rapid growth in U.S. consumer-oriented exports, let's take a closer look at what is happening in the global market. Fueled by rising incomes and changing consumer preferences, global exports of consumer-oriented high-value products continue to move well ahead of bulk commodities, with a 1990 value equal to \$88.1 billion. Since 1984, on a value basis, global trade in consumer-oriented products has grown by over 72 percent while trade in bulk commodities has dropped by over 10 percent. The outlook for the next 5 years for consumer-oriented trade remains positive, with forecasts projecting world trade to grow by at least 6 percent a year.

In 1990, global exports of all agricultural commodities amounted to \$208 billion, an increase of 23 percent (\$50 billion) over 1984. During this same period, exports of consumer-oriented products have grown by \$37 billion -- accounting for 74 percent of the growth in total agricultural exports.

During the 1984-90 period, the United States captured 17 percent of the world's growth in consumer-oriented exports -- which doubled our total exports of these commodities.

In the world market, consumer-oriented high-value exports surpassed bulk exports in 1987. As of 1990, these high-value products accounted for 42 percent of world exports, compared to just 34 percent for bulk commodities. Within the next 3-6 years, consumer-oriented products are expected to account for more than 50 percent of world agricultural trade.

USDA PROGRAMS SUPPORTING HIGH-VALUE EXPORTS

The United States has given much attention to the promotion of high-value products. USDA administers four basic types of export programs and high-value products are included in all of them. The four types of programs are:

- (1) Export Bonus Programs - the Export Enhancement Program (EEP), the Sunflowerseed Oil and Cottonseed Oil Assistance Programs (SOAP and COAP), the Dairy Export Incentive Program (DEIP).
- (2) Commercial Credit Programs - the GSM-102 and 103 Credit Guarantee programs.
- (3) Food Aid Programs - PL-480 and Section 416 Programs.
- (4) Market Development Programs - the Market Promotion Program (MPP) and the Foreign Market Development or Cooperator Program.

Each of these programs has its own specific objectives and criteria for operation. Consequently, the portion of program resources devoted to high-value exports varies. Also, for commercial programs such as the export bonus and credit programs, USDA's role is to provide export opportunities for U.S. exporters, but the extent to which those opportunities are taken advantage of depends on the private sector.

For example, while USDA provides exporters with the opportunity to make sales under the EEP by making initiatives available, many of the initiatives for high-value products expire with positive balances. If sales for the amount of outstanding EEP balances on all available initiatives were completed, as much as 30 percent of the bonuses awarded could be spent for high-value products. However, actual sales of high-value products under EEP resulted in only 8 percent of the bonuses being awarded to exporters of high-value products in fiscal year 1992.

EEP, however, is not the only export bonus program used for high-value products. The DEIP, SOAP, and COAP programs function in the same way and assist high-value products exclusively. Bonuses awarded in FY-92 for high-value products under all 4 bonus programs totaled \$177 million. This represents 17% of all bonuses awarded.

During the past several months, USDA has announced EEP packages for several high-value products for the 1992/93 marketing year. Also, the FY 1993 SOAP and COAP programs have been announced. The DEIP program, which operates on a calendar year basis, should have 1993 allocations announced in the near future. The following summarize these programs:

PRODUCT	QUANTITY	NUMBER OF ELIGIBLE COUNTRIES OR REGIONS
EEP (MY 92/93)		
Wheat Flour	2,010,000 MT	7
Barley Malt	175,000 MT	6
Vegetable Oil	870,000 MT	11
Frozen Poultry	58,000 MT	9
Pork	30,000 MT	1
Canned Peaches	9,000 MT	3
Table Eggs	40 Mil. Dozen	2
SOAP (FY 93)	365,000 MT	7
COAP (FY 93)	205,000 MT	8
DEIP (CY 92)		
Butterfat	51,800 MT	24
Milk Powder	212,700 MT	32
Cheese	4,700 MT	13

High value products are also assisted by USDA's export credit guarantee programs, GSM-102 and 103. In FY-92, credit guarantees were made available for \$ 1.4 billion worth of U.S. high-value product exports. This represents 22% of total guarantees made available during the year.

One-third of our food aid shipments consist of high-value products. These programs include titles I, II, III of P.L. 480 and the Section 416 donation programs. Flour, vegetable oil, blended foods and bulgur are some of the more significant high-value products exported under these programs.

In fiscal 1992, the second year of the new MPP, allocations of \$200 million were made available to U.S. producer groups and other organizations to help finance promotional activities for a wide range of intermediate and consumer-ready products, as well as bulk commodities, in more than 100 foreign markets. Nearly 80% of the allocations under this program went for the promotion of high-value products, making it our most prominent program aimed at expanding sales of these products. In addition, \$12 million of the \$37 million programmed under the Cooperator foreign market development program went to promote high-value products.

SUMMARY OF USDA EXPORT PROGRAMS
BY
TYPE OF PRODUCT SUPPORTED
FISCAL YEAR 1992

	EXPORT BONUS : PROGRAMS	CREDIT : PROGRAMS	FOOD AID : PROGRAMS	MARKET DEVELOPMENT : PROGRAMS
	BONUSES AWARDED	GUARANTEES : AVAILABLE	PRODUCT : VALUE	FUNDS : ALLOCATED
	----- \$ MILLION -----			
BULK	891	4,891	899	67
HIGH VALUE	177	1,407	513	169
OF WHICH				
-INTERMEDIATE	81	1,152	232	7
-CONSUMER ORIENTED	96	255	281	162
TOTAL	1,068	6,298	1,412	236
% HIGH VALUE	17%	22%	36%	72%

As you can see, high-value product exports are of growing importance to U.S. agriculture. Capturing new markets for these products present a new set of challenges for U.S. exporters. But the outlook is bright and the benefits for American agriculture and agribusiness can be great.

That concludes my remarks. I'll be happy to respond to questions during the question and answer session.

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Outlook '93

For Release: Tuesday, December 1, 1992

**WHAT WE KNOW AND DON'T KNOW ABOUT CURRENT WEATHER PATTERNS AND
GLOBAL CLIMATE CHANGE**

Norton D. Strommen
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Insight about the weather and climate as an essential renewable resource is more important today than at anytime in the history of mankind. Unfortunately, most of the world has never acknowledged weather and climate as a renewable natural resource. Yes a renewable but not an inexhaustible resource. The drought events of the last year have illustrated this point vividly in parts of the United States, Africa, Pacific Rim, Europe and Asia.

The debate about weather and climate change is not new. In the 1970's the focus was more on the question of increased variability in future climate and what it might mean to the sustainability of agricultural production. In the 1980's, the issue of increased variability was still debated. However, a greater concern about climate change was captured in the headlines of newspapers and science magazines throughout the world. This new focus was on the global warming issue believed to be related to the well-documented and increasing levels of several greenhouse gases in the atmosphere. These include carbon dioxide, methane, nitrous oxide, chlorofluorocarbons and other minor but radiatively important trace gases emitted into the atmosphere from natural and man made sources. Clearly this phase of climate change, with the potential for global warming estimated to be between 1.5 and 4.5 degrees C with the doubling in levels of carbon dioxide, has raised world interest in future weather and climate to a higher level of awareness. The estimates of warming, derived from the General Circulation Models (GCM's), will receive a great deal more attention in the decade ahead.

Before looking at the facts as we know them, it is important to define the meaning of the word "climate." The World Meteorological Organization has adopted the "normal" climate to mean the average of the measured site specific daily weather elements, such as temperature and rainfall, for a 30-year period of record. The current normals are for the period 1961-1990. The term "weather" refers to the observed daily events that when averaged for a period of time describe our climate. I also want

to stress that our climate, like our rapidly changing daily weather, is dynamic and not static. The climate of the world has been continually changing over the eons of time. However, it has only been systematically documented by instrumental observation for less than 150 years. The earlier documentation of climate change comes from indirect but reliable means, such as, analysis of sedimentation or pollen content contained in cores extracted from the earth, gas molecules entrapped in ice cores extracted from glaciers, recorded dates of ice formation on lakes and the geologic indications left by expansion and contraction of the world's major ice fields and the associated rise and fall in sea level. These earlier changes can all be directly attributable to natural causes.

Today, the potential for global warming is being described by some scientists as a man-induced warming of unprecedented magnitude. If this is correct it becomes essential to delineate the causes of natural change from those changes due to man's activity. This is a major issue that must be resolved and some key questions needing answers include: Is man's contribution to increased levels of greenhouse gases sufficiently great to overcome the causes of natural variability in the world's climate? If they are, what can and should be done to ameliorate man's contributions? Can the potential for change be reversed or only slowed? What would the impact be if no action were taken? Do we have the quality data needed to answer these questions? These are but a few of the many questions whose answers are being pursued by scientists around the world today. Specifically, the agricultural community must look critically at its contribution of man made greenhouse gases and evaluate actions it can take to ameliorate emissions while maintaining necessary food and fiber production levels.

Perhaps the strongest push for global warming came during the record-setting drought of 1988 over North America. Dr. James Hansen, Director of the Goddard Institute for Space Studies, used figure 1 to describe to Congress the global temperature pattern for the last 100 years. Based on this and other analyses presented at his Congressional testimony, newspapers reported that global warming, due to man's growing contributions of greenhouse gases, was already under way. Clearly, the temperature pattern showing the global warming trend since the 1880's is impressive at a first glance. However, when you look closer, there appears to be some significant irregularities from the pattern that should be expected given the curves for escalating levels of greenhouse gases during the last 50 years. The three periods of warming that stand out occurred from about 1885 to 1900, the second from about 1920 to 1940 and the most recent warming trend from the late 1970's to the current time. The total warming, based on the 5-year running mean curve, is between three and four tenths of a degree Celsius for each of

these periods. However, the total change for the 100-year period is only about six tenths of a degree C. If the warming is primarily the result of increasing levels of greenhouse gases, due to mans activity then we have a problem to explain the trend of over two tenths of a degree Celsius cooling observed from about 1940 into the mid 70's.

The 1940's to the mid 70's was a period of unprecedented industrial growth around the world with its associated rapidly escalating emissions of greenhouse gases and concentrations during an extended period of cooling. Figure 2 documents the changing levels of carbon dioxide compiled through analysis of gas molecules trapped in ice-cores extracted from the Antarctic ice cap. Similar patterns were noted for ice cores from Greenland and the Andes. The greatest rate of increase for CO₂, after 1950, occurs at a time when global temperatures were cooling. Thus, we must look beyond the simple greenhouse gas theory to find a more comprehensive explanation for the observed global temperature pattern. A monthly CO₂ curve, based on carefully documented data, of actual measurements since 1957 shows an annual oscillations of CO₂ levels which reflect the change in seasons; in particular the CO₂ levels decrease during the northern hemisphere summer when plant growth is most active and increases during winter when use of energy is highest and plant use reduced. The average rate of increase in recent years is about 1.5 ppm. However, small variations are noted - in particular the rate of increase flattened slightly during the mid-70's energy crunch. A great deal of knowledge has been developed about the carbon cycle in the last 12 years. Yet we still do not adequately understand the role of the oceans as a sink and at times a source for CO₂.

The curve for methane (CH₄), figure 3, is similar in shape to CO₂ and shows the sharpest increase during the last 40 years. The information on methane sources, both natural and man-made are very inadequate. Rice production is believed to be the primary contributor from man's activity but an adequate understanding about the natural sources still remains elusive. Curves for nitrous oxide and other trace gases also show patterns similar to those of carbon dioxide and methane. Currently, the best estimates suggest the potential warming contribution from the continued increases of the radiatively active trace gases other than CO₂, would be nearly equal to that for CO₂. Our best estimates are still subject to significant uncertainty because of data limitations and lack of a full understanding of the related atmospheric chemistry. Research continues to improve the accuracy of these estimates.

When the question of global change - variability - received extra attention in the mid-1970's, the U.S. Department of Agriculture, in cooperation with other Departments, undertook the task to

produce the best estimate of what the world's temperatures would be in the year 2000. The global curve of temperature observations developed for this work, figure 4, shows the pattern from 1880 to be similar to that found by Dr. James Hansen. These data provided a starting point. Next the study enlisted the help of leading climatologists from nations around the world to make their best estimate of what the global temperature pattern would be during the next 25 years.

These results, projected by the multiple curves, demonstrate that when given the same data as a starting point, the use of different assumptions or models can lead to highly different conclusions. These analyses also represent the divergence in thinking and knowledge base used as inputs by leading scientists from 17 nations. These results also demonstrate that our understanding of the very complex interactions that occur in the Earth-atmosphere system and produce our daily weather and climate is far from perfect.

One natural cause for climate temperature variation has been documented by analysis of the global temperature pattern changes after major volcanic eruptions. Figure 5 shows the change in the temperature pattern over the northern hemisphere observed after four major volcanic eruptions. The sharp cooling after a major eruption is related to the large amount of particulate matter ejected into the upper atmosphere. This particulate matter acts as a shield to incoming solar energy and effectively increases the earth's albedo, and reducing the amount of energy reaching the earth's surface. Effects of this cooling last approximately 2 1/2 years. I might point out Krakatau's eruption in 1883 is one of the largest and most heavily studied. It may also be a partial explanation of the rebound to higher temperatures beginning in the late 1880's. The reduction in solar energy after the June 1991 Mount Pinatubo eruption has now been documented and preliminary climatological analysis are confirming global temperatures have decreased about 1 to 1.5 degrees F.

Analyses of the global temperature patterns at a recent climate trends workshop provided important additional information about the regional differences. In particular it showed that more of the warming in the global data was contributed by the southern hemisphere data. Yet we know the southern hemisphere contributes a lower percent of the total global greenhouse gases emitted into the atmosphere and has a much greater percent of ocean surface. Both of these factors should dampen the pattern of temperature increases. This raises additional concern that the primary cause of the warming trend seen in the average global temperature is directly related only to increased levels of greenhouse gases. Tom Karl has also demonstrated that most of the warming in the United States is the result of higher average minimum temperatures that more than offset slightly lower average maximum

temperature averages.

During discussions with Dr. Hansen, about the data used in his temperature trend analysis, he confirmed that the "urban heat island" effect, a well-documented warming in the centers of population of our large metropolitan areas, had not been removed from the data in figure 1. In an analysis of United States data by Tom Karl, it was shown that removal of the contribution from the urban heat island effect could significantly temper the observed warming described by Jim Hansen. However, the analysis of the urban heat island for the United States may not be directly applicable to other areas. By selecting only the best long term observation from non urban sites in the United States, about 1,200 stations, the period 1930 to 1988 - figure 6 - the data analysis, in fact, show a slight cooling trend. This raises further questions about the exact role being played by increasing levels of greenhouse gases and the 1980's are well within the observed historical temperature range. The temperature pattern and trend for Europe is very similar to that of the United States.

The bases for projections of strong global warming with a doubling of CO₂ levels, are produced by General Circulation Models or GCM's. The GCM's, however, only reflect what you tell them to do. By inserting into the GCM equations, a coefficient for elevating levels of greenhouse gases, you would expect to get some degree of warming. A major weakness of the past GCM models was their inability to adequately reflect the energy flux exchanges between the earth-atmosphere interface. This includes water vapor from the oceans, rivers and lakes, heat from the land and extraction of heat over ice and snow fields and evapotranspiration from plants. The water-vapor flux is the source of moisture for the formation of clouds leading to rainfall. The water vapor content in the atmosphere is also the atmosphere's most abundant greenhouse gas. It is only because of the water-vapor and, its ability to selectively trap outgoing long-wave terrestrial radiation, that life on our planet is possible. Without the benefit of this greenhouse gas warming, the earth would be too cold to sustain life as we know it.

The ability to more accurately integrate earth-atmosphere energy exchanges into the GCM models has significantly improved the most recent GCM models performance. Work on this difficult task has progressed with urgency in the last 5 years. Integration of improved coefficients from the Earth Radiation Budget Experiment (ERBE) has provided better insight on the potential effects of cloud cover changes and resulting global temperatures. This confirmed that just a small increase in cloudiness expected with global warming and greater evaporation rates could exceed the potential of warming related to increased greenhouse gas. These findings illustrate the degree of sensitivity in atmospheric

response and how important it is to improve our understanding of the complex interactions between increased clouds and rainfall that may occur in the atmosphere. Initial results from coupled ocean-atmosphere GCM's have also shown a reduced rate for Global warming. While these are encouraging results, they also confirm today's GCM model output is simply not adequate to provide the desired quality analysis needed, and thus care must be used when using GCM analysis to make policy decisions.

Before turning to the question of precipitation, I would like to return briefly to the question of variability. Since the plant is an excellent integrator of climate over the growing season, the national crop yield series for corn is used to look at climate variability, figure 7. The three periods covered are from 1919 to 1949, 1950 to 1970 and from 1971 to 1991. I have defined yield variability to be the percent reduction from the previous record national yield. In using this definition, the observed maximum reduction is about 35 percent in the 1930's, only 5 percent in the 50's and 60's until the cornblight caused losses in 1970. It confirmed that the effects of weather and climate on crop yield variability had not been totally overcome through application of modern technological practices as many believed in the previous 2 decades. Yield reductions in 1974 raised the initial question about the potential for greater variability. With the 1980's now history, it is worth pointing out that the reductions in yield from the previous record national yield again reached about 35 percent, the same as experienced in the 30's. Looking at the yield data from 1866 to 1918, a similar percentage reduction was also observed before the turn of the century. Average U.S. temperatures figure 6, are delineated for the same three recent periods as the corn yields. Noteworthy is the strong correlation between the temperature and yield variability. Thus, for the United States the period of the 50's and 60's appears to be the anomaly. The variability of the 1980's is simply a return to that found in earlier climatic and yield records. However, even more important to the global warming question is the temperature trend during this period of maximum emission increases for greenhouse gases into the atmosphere. The continued slight cooling to neutral trend of the last 60 years raises more questions about the exact role and magnitude of the greenhouse theory currently proposed to explain the global warming pattern shown in figure 1. I acknowledge that many other factors can - and do - affect national corn yield, but time does not permit a full discussion now.

Precipitation is a much more difficult parameter for analysis. The pattern of variability may be described by deviations around the 50th percentile, and for the globe does not exhibit any definable trend throughout the 120-year period. This simply says the overall total rainfall appears to be oscillate from year to year within some set range. When these data are broken down into

regions, some trends do appear, figure 8. For Europe, like the United States, there is no significant trend apparent from the natural variability. Results for the Soviet Union suggest a slight trend toward increasing rainfall over the last 100 years. The North Africa and Middle East trend shows a reduction in rainfall that appears to have accelerated in over the last 40 years. Southeast Asia data also appear to show some increase in rainfall over recent years, but this change is well within observed historical variability. When these data are organized by latitude, little change in trend is noted for the Equatorial regions. However, a decrease since 1950 is more pronounced for the 5-35 degrees N belt, i.e., the sub-tropics, while an apparent increase in rainfall is confined to the higher latitudes or temperate zone from 35 to 70 degrees N. Explanations for the recent trend changes are not clear to me at this time. However, it is most likely related to the frequency and strength of the mid-latitude storms. The increase in cloudiness associated with these storms could also partially account for the changed variability noted in the temperature patterns over the United States and Europe.

The GCM's have an even more difficult time in estimating potential changes in precipitation than potential temperature changes. In a comparison of the estimated precipitation, GCM models output for key agricultural regions could not agree on the signs of change. Some of the GCM's suggest rainfall would increase, others that a decrease would occur. One GCM result produces an expanding desert in the grain belt of the U.S. Great Plains while another increased moisture supplies. These conflicting results from the GCM models must be clarified before major policy actions are finalized.

SUMMARY AND CONCLUSIONS:

Data extracted from ice-cores provide an excellent historical summary of how greenhouse gas concentrations in the atmosphere have changed with time. Detailed observations made during the last 30 years also confirm that CO₂, CH₄, N₂O and other greenhouse gas levels are indeed increasing in the atmosphere. The pattern of increased greenhouse gas levels is observed globally, illustrating the effectiveness of the atmosphere to disperse emissions from whatever the source, be it natural or from man's activities. Climate variability is still a major factor in determining crop yield response. The GCM's are the best tool available to estimate the potential for global warming. However, they can not yet adequately depict the many complex interactions of the earth-atmosphere system and hence our future climate. Research has clearly shown differing plant response changes when grown under elevated levels of CO₂. Hence the agricultural community must not ignore this issue in plant breeding programs and in seeking new management techniques to

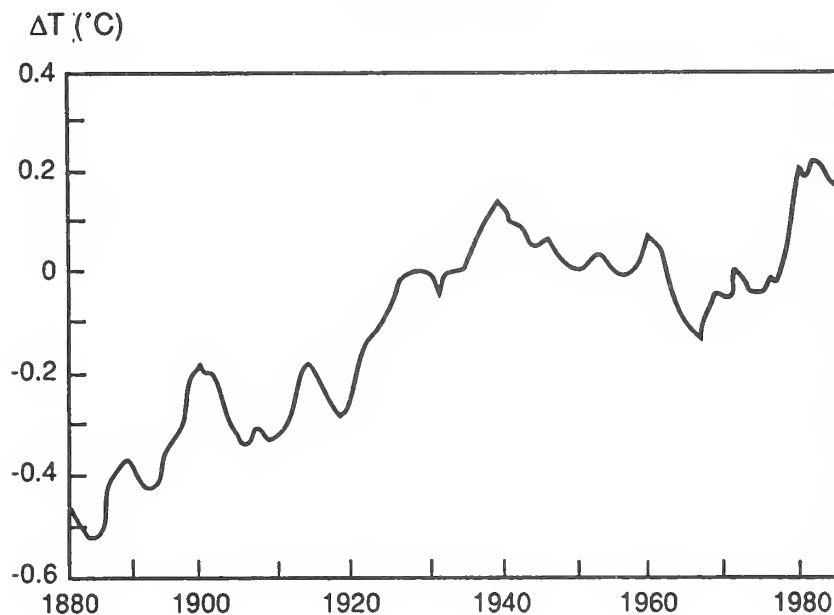
reduce agriculture's greenhouse gas emissions while sustaining production. Because increased levels of greenhouse gases impact global climate patterns, the problem can only be addressed through worldwide cooperation. For agriculture, understanding the regional climate pattern changes are of greatest importance. The GCM's cannot yet produce accurate estimates at the regional level. Thus, much work remains to be done before more definitive answers can be provided to policymakers. However, research is forging ahead on many fronts. The remaining papers for this session will focus on some of these activities already underway.

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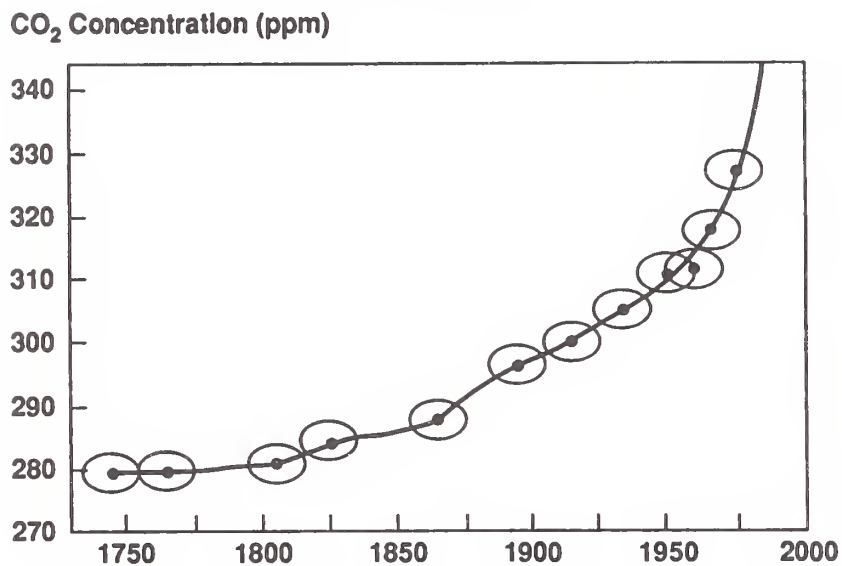
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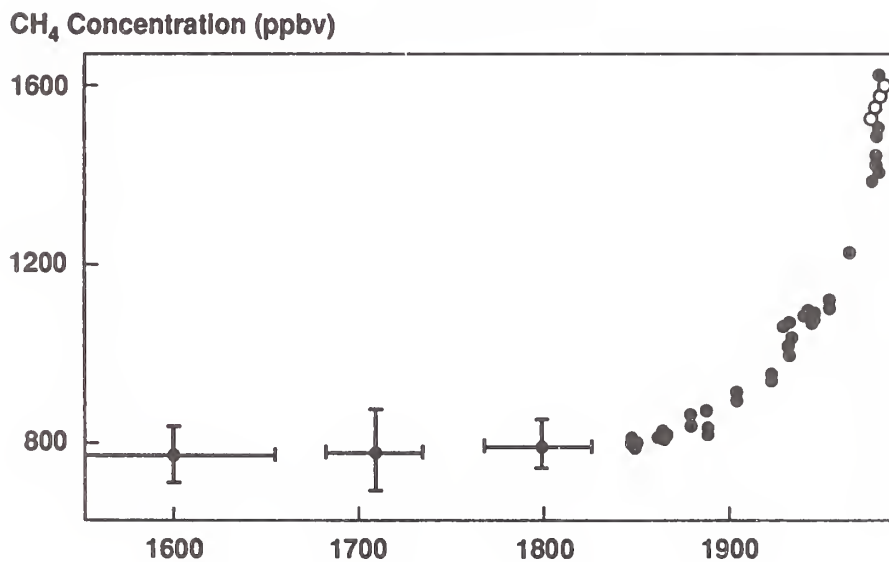
Normalized 5-Year Mean Global Temperatures 1880-1987



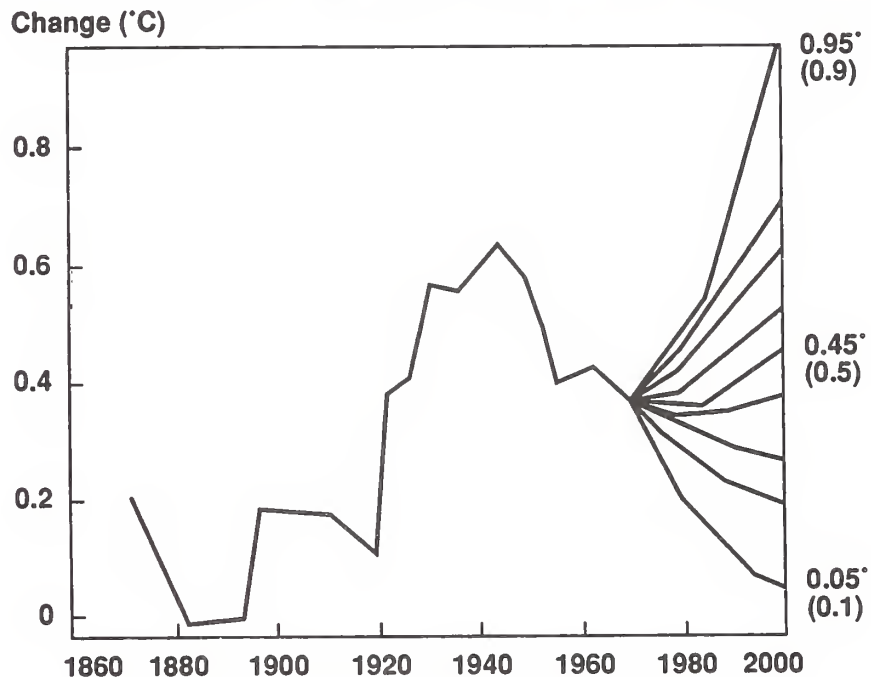
CO₂ Concentration in the Siple Core 1750-2000



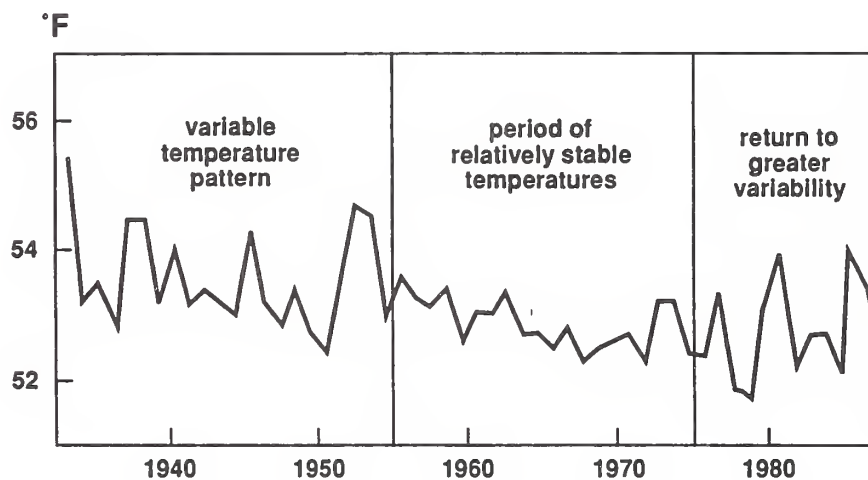
Historical Changes in Atmospheric Methane 1600-2000



Global Annual Mean Temperature Change Actual, 1860-1975 and Projected, 1976-2000

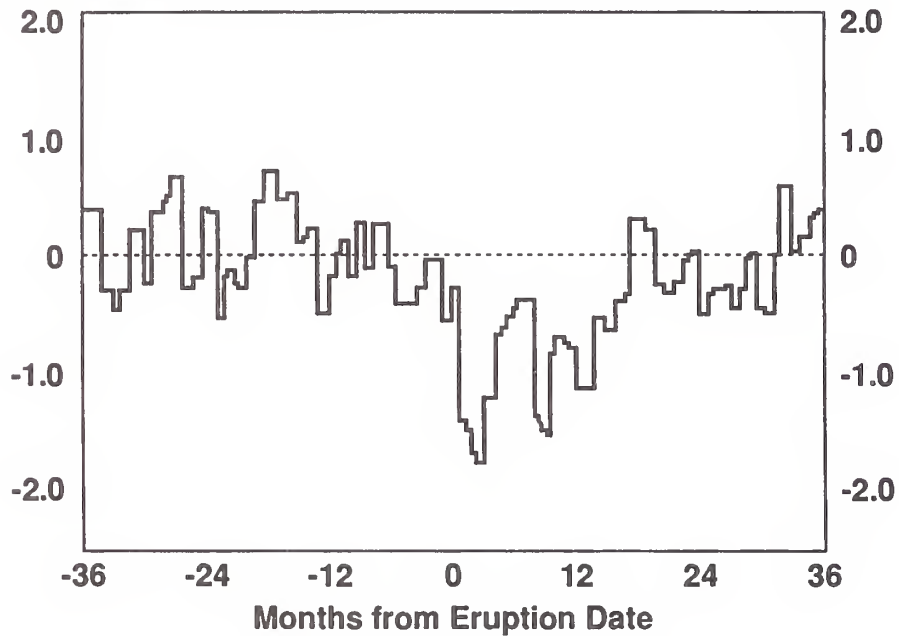


Average Annual U.S. Temperature 1931-87

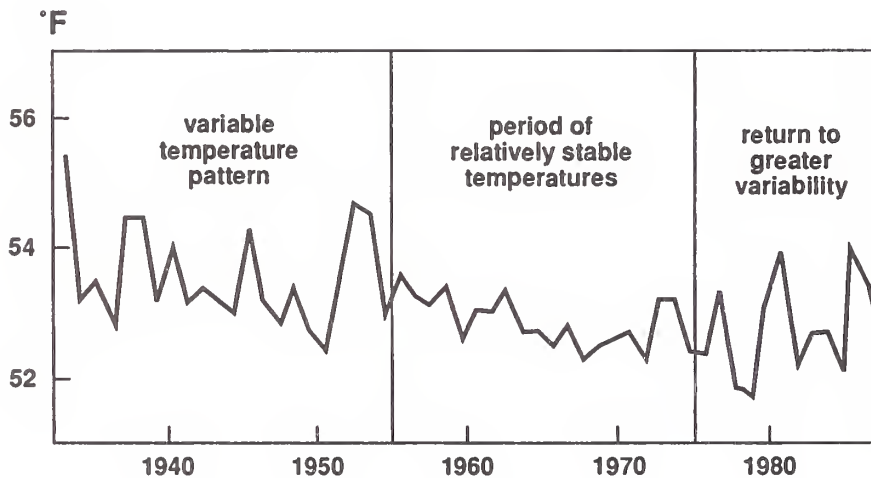


Impact of Five Largest Volcanic Eruptions on Northern Hemisphere Temperatures 1880-1980

Standard Deviation Units

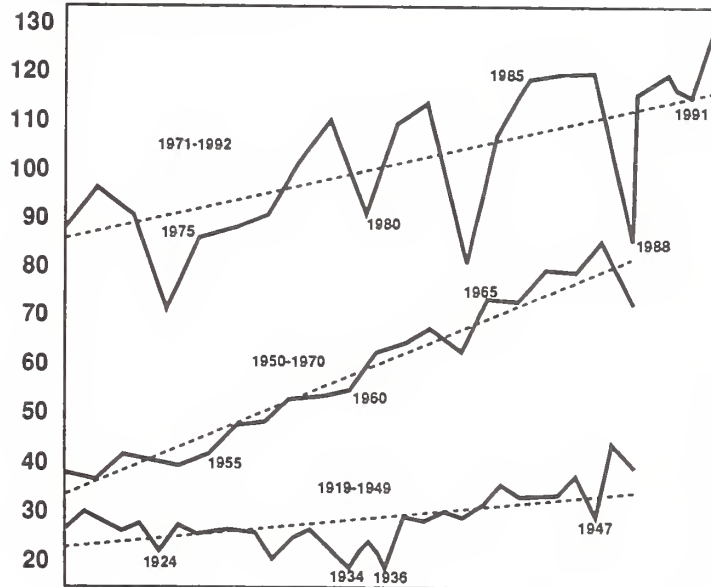


Average Annual U.S. Temperature 1931-87

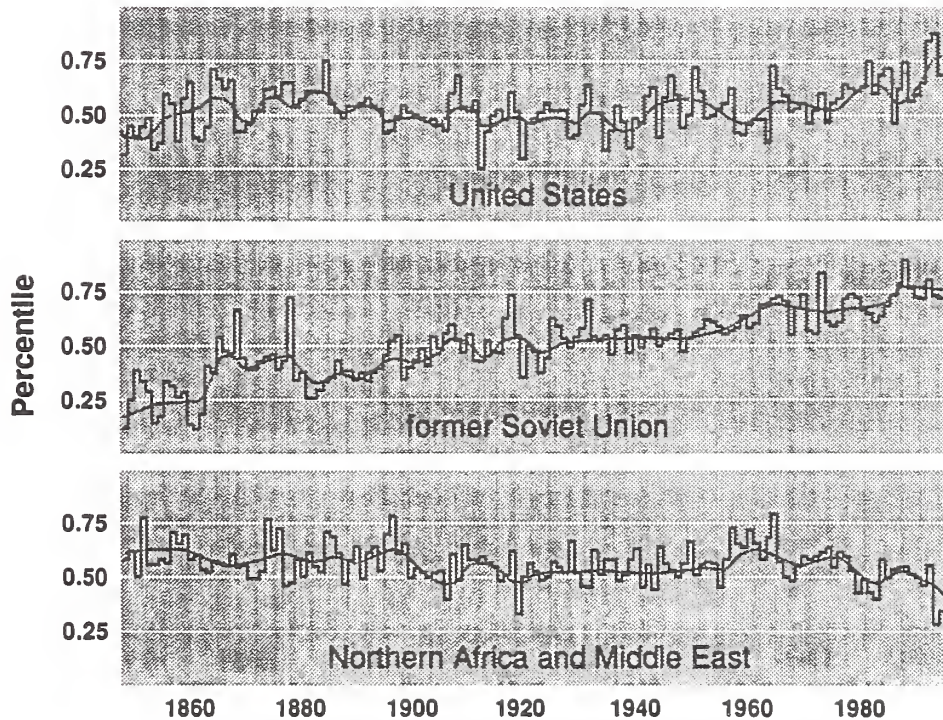


U.S. Corn Yields 1919-1992

Bushels per Acre



Annual Precipitation Index



Outlook '93

For Release: Tuesday, December 1, 1992

WHAT THE RIO FORESTRY ACCORD MEANS FOR U.S. FORESTRY

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History-making changes are taking place in the geopolitical and social structures worldwide. Markets are becoming increasingly global. Transboundary and global environmental impacts are becoming of increasing concern. There is a new world order emerging, and it is riveting our attention on its problems.

In the face of these changes, our understanding of natural and human processes and our ability to manage information is unprecedented. We can today synthesize information in ways not previously imaginable. Think for a moment: We take highly sophisticated and integrated computer modelling of weather for granted--we even expect it nightly on our televisions screens.

People, governments, and institutions are beginning to grapple with the problems facing us in newly robust and purposeful ways. Collectively, we are beginning to recognize the inextricable linkages between the social, economic, and environmental dimensions of sustainability. The negotiations which took place for the United Nations Conference on Environment and Development (UNCED) are a global response to many of these issues.

To fully appreciate what the Earth Summit and its accords mean for forestry in the U.S., it is necessary to set the stage by describing the role of forests in the U.S. economy and some international aspects of forests. It will also be useful to discuss the role of the USDA Forest Service in caring for our Nation's forests and in serving people's needs.

Economic significance of forests in U.S.

One Third of the United States, over 730 million acres, is covered by forests. Nearly two-thirds of this, 483 million acres, is productive timberland. More than half--57% of timberland is owned by farmers and other individuals. Forest industries own 15% of the timberland and the balance of 28% is in public ownership--most of which is contained in National Forests administered by the USDA Forest Service.¹

Most people know that our Nation's forests provide a wide diversity of goods, services, and amenity values. It is not well known, however, that the value of timber produced from our Nation's forests is either the number one or two agricultural crop produced in this country, depending on the year. In 1986 for example, figure 1 shows that the value of timber crops was \$ 12.6 billion, compared to corn which was \$ 12.4 billion. Lumber and other solid wood products rank in the top three manufacturing industries in most regions in the country. Figure 2 illustrates that the timber industry nationwide was responsible for more than 1.5 million jobs in 1986 and salaries paid out exceeded \$32 billion.¹

International Trade

Forest Products figure significantly in U.S. international trade, as shown in figure 3. They account for approximately 4% of U.S. Imports and Exports. The U.S. is the world's leading importer of forest products, and second only to Canada in forest exports.¹ Even though the U.S. accounts for only 7% of the world's forests, as shown in figure 4, it is the world's largest single producer of forest products.

The U.S. also consumes, as shown in figure 5, more of the world's forest products than any other country or region. The U.S. has approximately 5% of the world population² but consumes 28% of the world's industrial forest products. The importance of the linkages of our economy to the economies of other countries through the international marketplace is obvious.³

Roles of the USDA Forest Service

The USDA Forest Service mission focuses on four areas of natural resource management:

- - National Forest System
- - Research
- - State and Private Forestry
- - International Forestry

National Forest System: The Forest Service has authority and responsibility for management of a large portion of U.S. forests through the National Forest System which contains 156 National Forests, 20 National Grasslands, and 71 experimental forests, covering 191 million acres. It receives more recreation visitors than any other public land area and contains 47% of the U.S. softwood timber supply.

State and Private Forestry: The Forest Service also has a large extension branch through State and Private Forestry which offers technical and financial forestry assistance to State and private forest landowners. The Forest Service works to bridge ownership and organizational boundaries to promote the best use of America's resources through

activities in multi-resource management and stewardship, forest health and protection, rural America, urban and community forestry, and natural resource conservation education.

Research: Forest Service Research has the most extensive integrated forestry research program in the world. The agency has 714 scientists who conduct or participate in 2,800 research projects at 74 locations worldwide. The agency's research program is focused on providing the scientific basis for numerous critical forest and rangeland management decisions for the Nation and the world in forest protection, resource analysis, forest management, forest environment, and forest products and harvesting.

International Forestry: The International Forestry branch of the agency fosters the conservation of natural resources associated with the world's forests, and promotes the economic, social, and cultural well-being of people. The agency provided technical assistance for 372 projects worldwide last year both directly and in cooperation with the U.S. Agency for International Development (AID). In addition the agency shared its expertise through AID's disaster assistance support program in assignments as far reaching as providing assistance to the Kurds in Turkey and northern Iraq.

The Earth Summit

The Earth Summit, more properly known as the United Nations Conference on Environment and Development, (UNCED) was described by the Secretary General of the conference as "the most important conference in the history of humanity." It was the largest diplomatic effort ever mounted and marks a most significant turning point in the affairs of the world. It was the first time most of the world leaders came together. They came in peace. And when they came together, they proclaimed the inextricable linkage between environment and development.

UNCED was both a catalyst and an expression of deep rooted changes taking place in the world. It marked the turning point from an old world order dominated by national security issues defined along an east-west axis to a new world order where the notion of national security embraces issues of economic and environmental security defined along a north-south axis. This new order is expressed in terms of economic and social development and stewardship of natural resources.

The intertwining themes of the economic, social, and environmental dimensions of sustainability were woven throughout all of the negotiations and agreements. While the Earth Summit in Rio marked the end of 2 years of extensive diplomatic negotiations it also marked the very beginning of a new era. The actual outputs of Rio are all starting points:

- Immediate action was initiated to deal with biodiversity and climate change through signing of two legally binding conventions.
- A consensus of political will was declared in two sets of principles--one on environment and development, the other on forests.
- A global action plan--Agenda 21--was adopted to put the world on the course of sustainable development for the twenty first century.
- There was agreement to establish within the United Nations a Commission on Sustainable Development which will provide an intergovernmental forum for following up the agreements made at UNCED.

The Rio Declaration on Environment and Development--A proclamation of 27 principles is aimed at meeting the needs of present and future generations by integrating environment and development.

Forest principles express a consensus of international political will on a wide range of issues including functions of forests, integration of environment and development, nationally based actions, involvement of people, research and education, trade, and international cooperation.

Agenda 21 is an 800-page document of 40 chapters that expresses a consensus on global partnership for sustainable development and provides a blueprint for moving the world to sustainable development by the 21st century.

Forests, being the Earth's largest single terrestrial ecosystem were of central consideration at UNCED, being the subject of forest principles and one chapter of Agenda 21, as well as being important parts of both treaties.

The United States took a very active role in UNCED, particularly in forest issues. Forests were our government's highest priority at the conference in Rio, and will be central to our implementation of UNCED agreements. The United States presented initiatives at Rio to help conserve the Earth's forests and to demonstrate U.S. commitment. The initiative includes \$150 million in new bilateral forest assistance and a domestic forestry component described below.

Implications For U.S. Forestry

UNCED signaled the globalization of forest issues. UNCED also declared that forests and forestry are firmly connected to social, economic, and environmental issues outside of the forests. The first preambular paragraph of the UNCED forest principles

proclaims that "the subject of forests is related to the entire range of environmental and development issues and opportunities, including the right to socio-economic development on a sustainable basis."⁴

New terms of engagement between the North and South, between the rich countries and the poor countries, have arisen through UNCED. As traditional security and strategic claims have waned after the cold war, developing countries have begun to recognize new strategies for demanding concessions from richer countries. Developed countries ask developing countries to protect their environment because we recognize therein our own interests. Developing countries demand that developed countries stop unsustainable patterns of consumption and production which lead to a very small proportion of the world's population consuming most of the world's resources.

The notion of a global commons or global interest in forests was hotly debated at UNCED, but no consensus was reached. Developing countries were acutely aware that if a global interest existed, rights and obligations that may infringe on national sovereignty would be sure to follow.

Forest conditions in a particular country, however, were legitimate subject of debate. Developed countries' interest in stemming the tide of tropical deforestation was countered by developing countries charges of destruction of old growth forests in the Pacific Northwest of the U.S. and destruction of European forests through acid rain.

Because of the strong positions we and other developed countries took at UNCED, domestic management of public and private forests has become a matter of international debate. We can expect domestic public and private forestry to come under increased scrutiny. We are being held to the same high standards and values we proffered.

Environmental groups, industry and professional societies participated in UNCED negotiations to an unprecedented extent. They see themselves as key players in the conservation and sustainable development of forests. They are also acutely interested in domestic forest issues. Many groups will be taking steps to ensure that we practice what we preach. Some will increasingly assert that national or global interests override private interests when significant adverse environmental effects may occur.

We can expect privately held forest lands to be held to high standards by the public--perhaps even to the point that some of the basic tenets of property rights will be challenged in the name of environmental protection for the common good. This point has not been lost on the domestic timber industry.

Members of the American Paper Institute, the majority of industrial forest land owners in the U.S., have already responded to this issue by developing a code of conduct for forestry practices. Chief executive officers have to certify annually that their company is

meeting the code as a condition of continued membership in the association. This code of conduct goes well beyond traditional industry practices with regard to incorporating environmental values in forest management.

On public lands, the Chief of the Forest Service and Director of the Bureau of Land Management made announcements--as part of a Presidential initiative at Rio--to end the use of "clearcutting" as a standard commercial timber harvest practice on Federal forest lands, as part of an "ecosystem approach" to the sustainable management of forests.

States, because of their authority to regulate forest practices on private lands, will also come under increasing scrutiny. Differences in environmental standards between Federal and State governments will be brought more sharply in focus through the public concern and debate. Economic, social and environmental sustainability across jurisdictional and property boundaries will be a recurrent theme.

International trade was also a subject of contentious debate. Many developing countries, however, particularly those whose harvest of timber is often regarded as unsustainable, demanded an end to boycotts of timber by consumers, municipalities, and states. They asserted that under the General Agreement on Trade and Tariffs, developed countries, even where constitutions distribute rights among states and local governments, have an affirmative obligation to ensure free trade in all tropical timber, whether it is sustainably produced or not.

Although the U.S. did not sign the convention on biodiversity, it did and continues to actively support the basic principles. Protection of biodiversity will continue to be of growing concern both on private and public lands. The local, regional, and global dimensions of biodiversity will all be subjects of intense continued debate.

There is still a lack of understanding or agreement among the environmental community about what constitutes conservation and sustainable management of natural resources. Protected areas like wilderness and research areas will continue to be the lowest common denominator and the management option of choice for many who want to protect the environment--both domestically and internationally.

As corporations and government agencies move ahead with strategic and tactical planning, they will increasingly be challenged to make good on the commitments that the United States made in Rio to social, economic, and environmental sustainability. The Forest Service for example, in its strategic and tactical land management planning conducted under the mandate of the Resources Planning Act, is embracing both the spirit and substance of the UNCED accords.

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U.S. Timber and Agricultural Crops

1986 Value in \$Billions

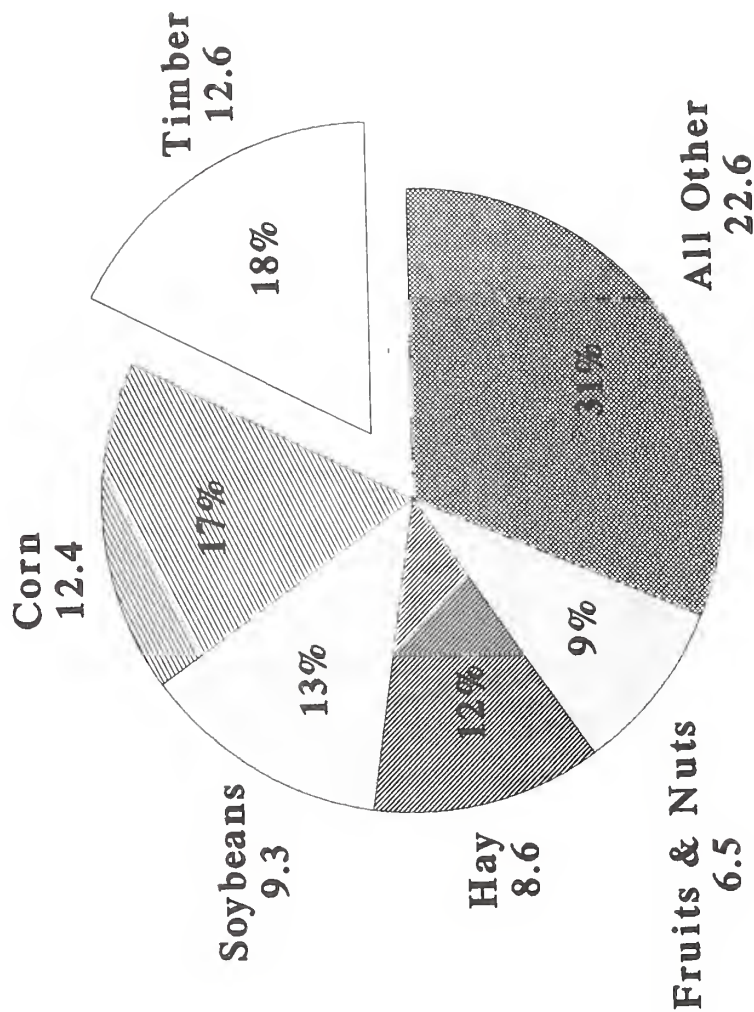
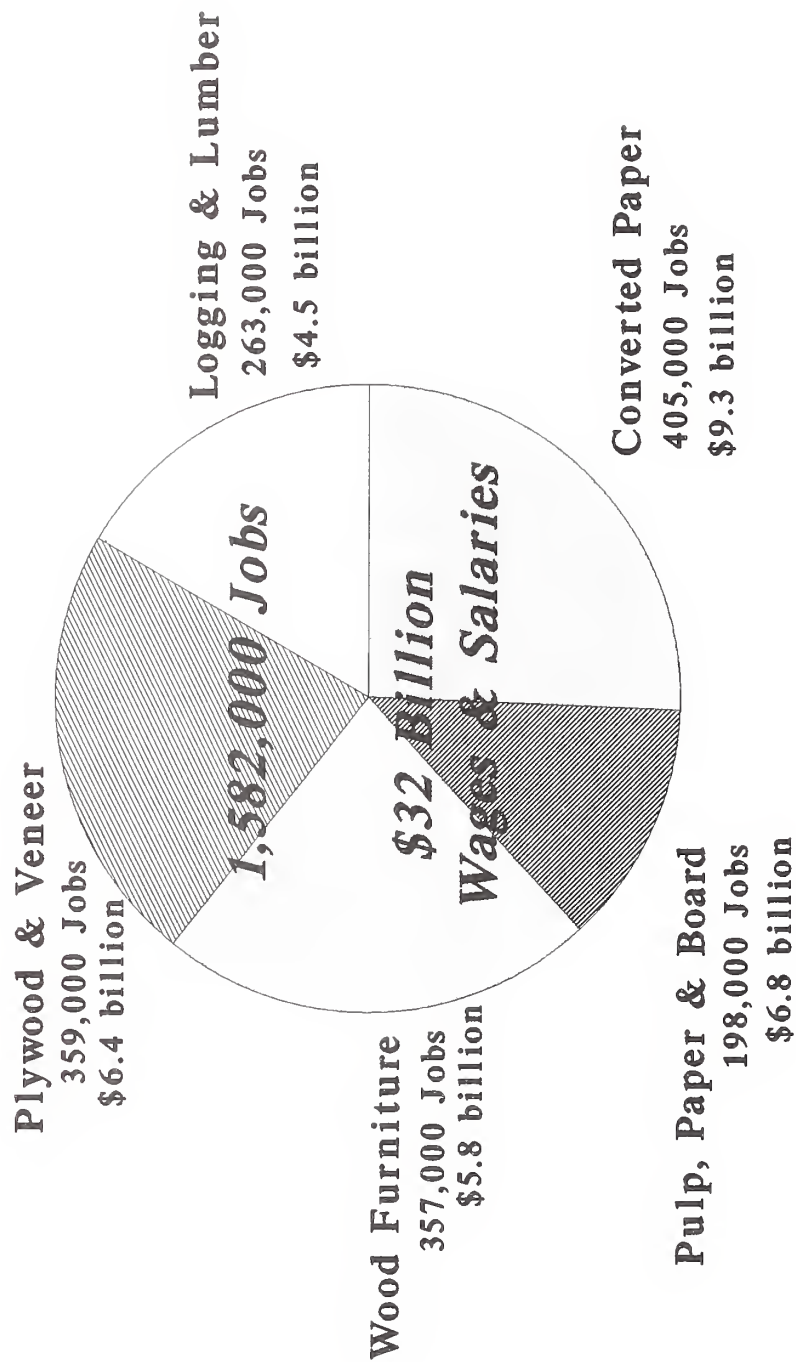


Figure 1

Source: USDA-FS Gen. Tech. Report RM-199

Timber Industry Employment

Jobs and Wages/Salaries, 1986

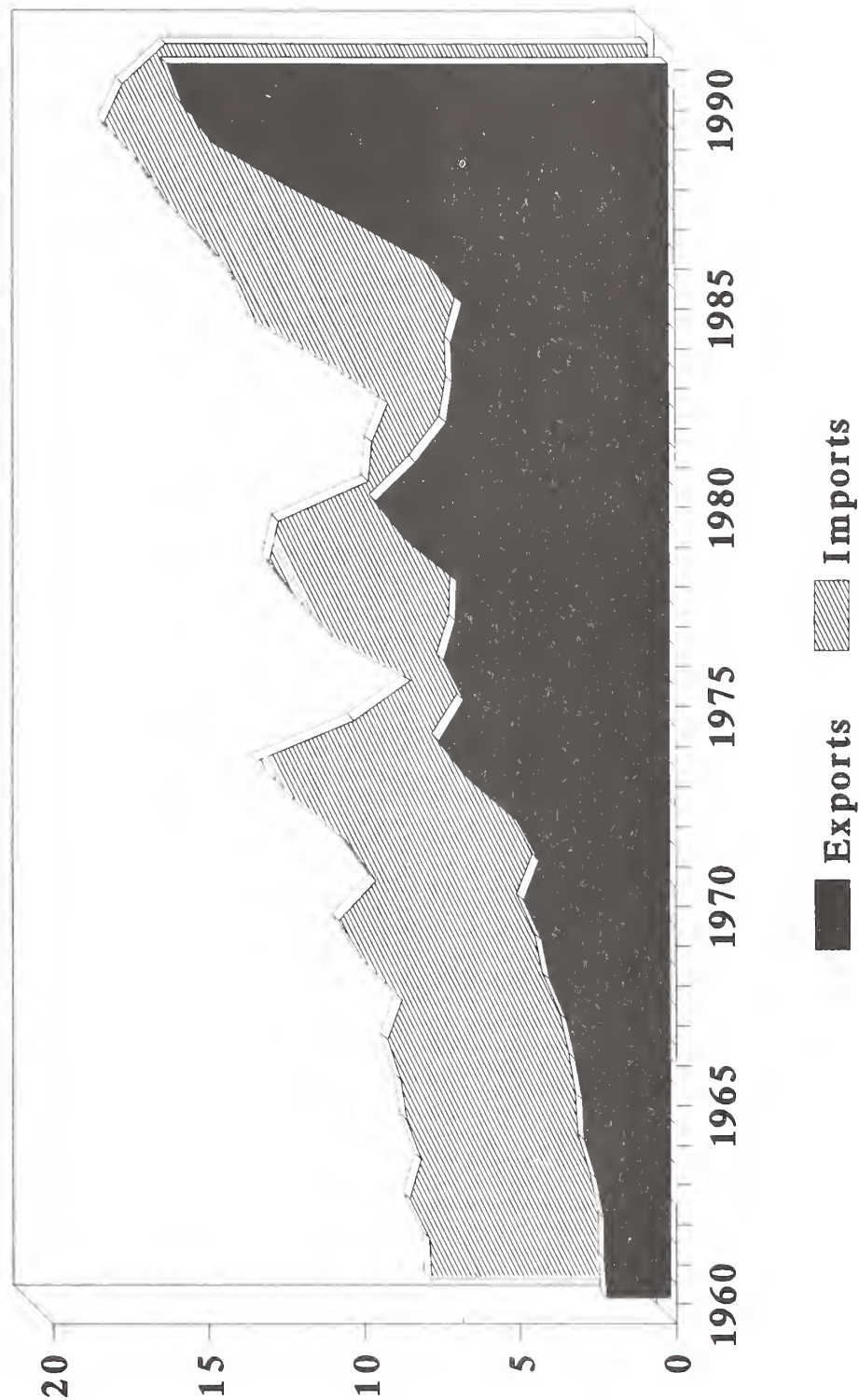


Source USDA-FS Gen. Tech. Report RM-199

Figure 2

U.S. Forest Products Imports & Exports

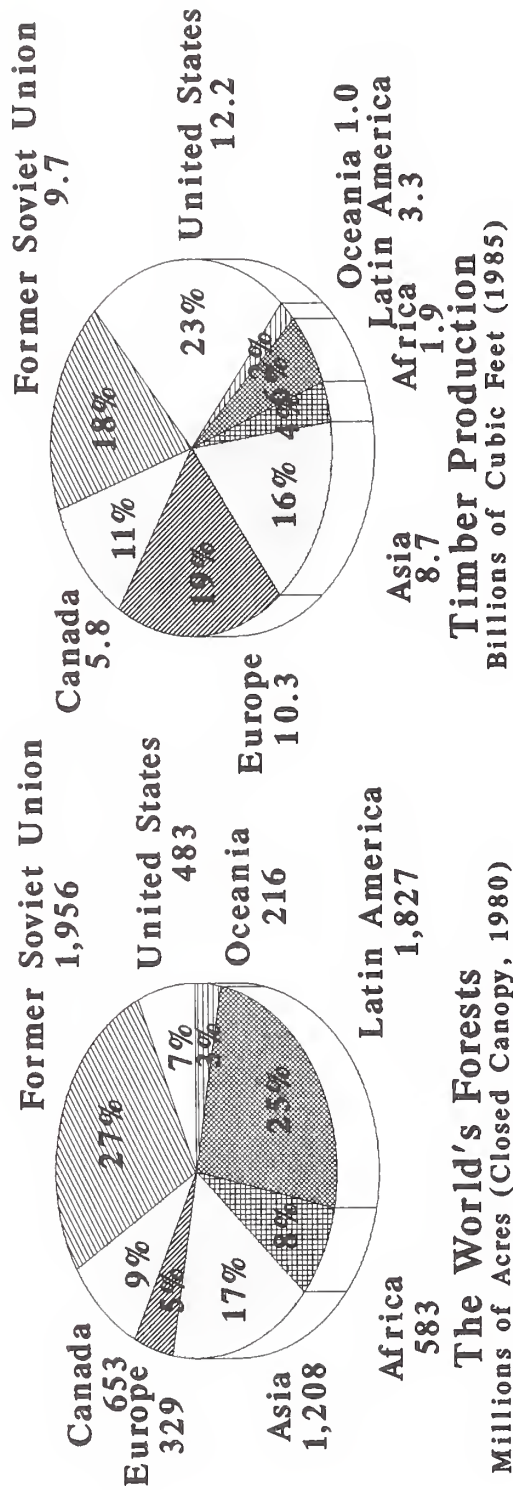
Billions 1982 dollars



Source: USDA-FS Misc. Pub. No. 1486

Figure 3

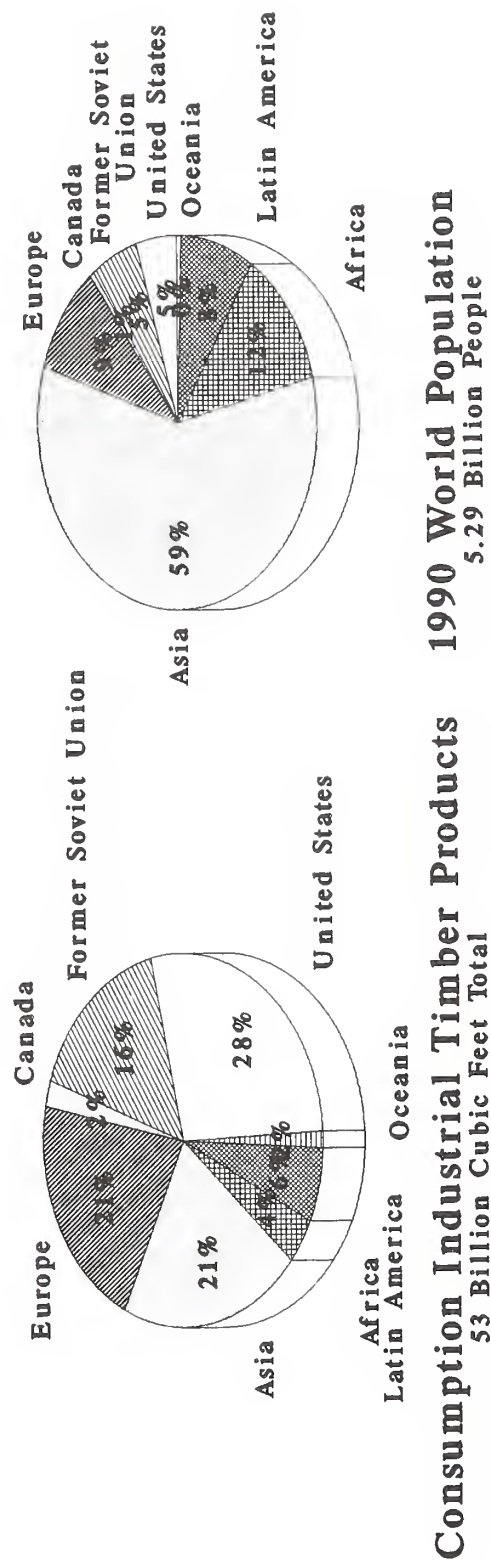
Timber Production & the World's Forests



Source: USDA-FS Gen. Tech. Report RM-199

Figure 4

Timber Consumption & Population



Source: USDA-FS Gen. Tech. Report RM-19
WRI, 1992, "World Resources 1993"

Figure 5

Outlook '93

For Release: Tuesday, December 1, 1992

POTENTIAL CLIMATE CHANGE EFFECTS AND U. S. AGRICULTURE'S RESPONSE

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It is generally agreed that change, and in particular climate change, on our planet, is a naturally occurring phenomena. We have also generally agreed upon those changes that humankind affects. What is not agreed upon is the rate or magnitude of those changes and the effects they will have on the living things of the planet. Agriculture, America's most important outdoor enterprise is inextricably linked to weather and climate. Prophecies of climate change; doom or boom, are cause for scientific concern. In lock step with the Federal Coordinating Council for Science, Engineering and Technology (FCCSET) Committee on Earth and Environmental Sciences (CEES), Research Plan for Our Changing Planet, the United States Department of Agriculture developed the "U.S.D.A. Global Change Strategic Plan" for coming to grips with these scientific concerns. It would be an overwhelming task for me to here review for you the entirety of the plan, nor other plans of the agribusiness community. Rather, I will deal with a select set of key issues elucidated by the CEES in its initial executive summary and attendant issues that I perceive as fundamental to agriculture's policies for responding to climate change. I will further constrain my remarks to research, the arena I am most familiar with. This in no way should be construed to imply that education, technology transfer or the private sector responses to climate change are of any less consequence or importance.

Early on, CEES identified three overarching needs for an effective global change program. To paraphrase, they were (1) monitor the environment; (2) understand and quantify biological and physical responses to the environment; and (3) develop models useful for assessing and predicting environmental impact.

Agricultural and Environmental Monitoring Networks

Monitoring networks are fundamental to establishing a base line to identify the current situation and for determining changes taking place. Monitoring weather and climate parameters must, therefore, be a cornerstone building block for any agricultural research response agenda. In 1940, responsibility for our nation's weather services was moved from the Department of Agriculture to the Department of Commerce (DOC). Under DOC's direction, an exemplary aviation network has been developed. Unfortunately, this network does not meet the needs of the agricultural community, either with regard to its managed agroecosystems or its wetlands and other related ecosystems and animal habitats. For example, weather monitoring stations located adjacent to airport runways or on inner-city buildings are not representative of conditions on farmlands, forests, wetlands, estuaries or other important ecological systems. The few stations within the aviation network which are located in representative areas for agroecosystems do not monitor variables such as incident solar radiation, the driving force of photosynthetic and evaporative processes.

Already, several states and agencies have established weather station networks to make up for the

lack of a national agricultural weather monitoring network. These are not coordinated either regionally or nationally, and as a result, the environmental data collected, sensor type and exposure vary considerably among networks. This lack of standardization within and across regions makes research concerning climate change and attendant other issues such as water and air quality, acid deposition and drought difficult. These agricultural and environmental monitoring networks would not only benefit from, but require a system, that promotes and coordinates standardized agricultural and environmental monitoring data acquisition systems and easy exchange of data.

A National Research Support Project (NRSP) is being considered by the Agricultural Experiment Station system to coordinate and focus at a national level on climate and weather-related research of relevance to agriculture. It is expected that this NRSP will be closely coordinated with programs of other federal and state organizations involved with agricultural weather. Experiment stations are uniquely positioned to play a leadership role in deploying and operating agricultural and environmental networks relevant to climate change. The experiment station system is comprised of main and branch station locations throughout the United States and its territories (Figure 1). These stations are situated in different climate, soils and cropping regions for the purposes of research. Many of these stations are 100 and more years old and have some of the longest and best quality historic climate records available. They have the personnel and infrastructure to assure a continued history of quality data and a committed dependency on this information. They and their colleagues in the Extension Service are best able, if funded, to provide a critical component of a global change data base.

Automated weather stations already dot the landscape of the continental United States (Meyer and Hubbard, 1992) (Figure 2). These weather stations suited to agricultural and environmental monitoring networks, almost exclusively, are not a part of a national network. Various agencies of the USDA are responsible for many of these automated monitoring stations. But, no coordinated or coherent USDA program for agricultural weather and atmospheric resources research information exists, nor does NOAA provide programs or services that directly address these agroecosystems and other agriculturally related climate change issues.

The 1990 Farm Bill (Subtitle D, Section 1637) authorized the National Automated Weather Information Systems (NAWIS) office to have the responsibility for providing a nationally coordinated agricultural weather information system based on the participation of universities, State programs, Federal agencies and the private weather consulting sector, and aimed at meeting the weather and climate information needs of agricultural producers. Unfortunately, this authorization went unappropriated and NAWIS remains yet to be established within the USDA.

In a report to the Experiment Station Committee on Organization and Policy (ESCOP, 1991), the Agricultural Weather Issues Ad Hoc Subcommittee reported:

"The most outstanding fact about the agricultural weather monitoring network is that there isn't one."

A recent survey (Meyer and Hubbard, 1992) found 831 permanent and approximately 150 portable automated weather stations throughout North America. Integrating some of the 831 automated weather stations and adding stations in key locations should be given serious consideration. The Federal Aviation Administration has been successful in linking their weather data needs to those of the National Weather Service, leading to an inter-agency network called ASOS (Automated Surface Observation System) with weather stations in a density of 8 to 10 per state. The USDA could pursue a similar effort. And, the recently established NOAA, Climate Analysis Center, Regional Climate Centers, should be the point of network interface between the agencies.

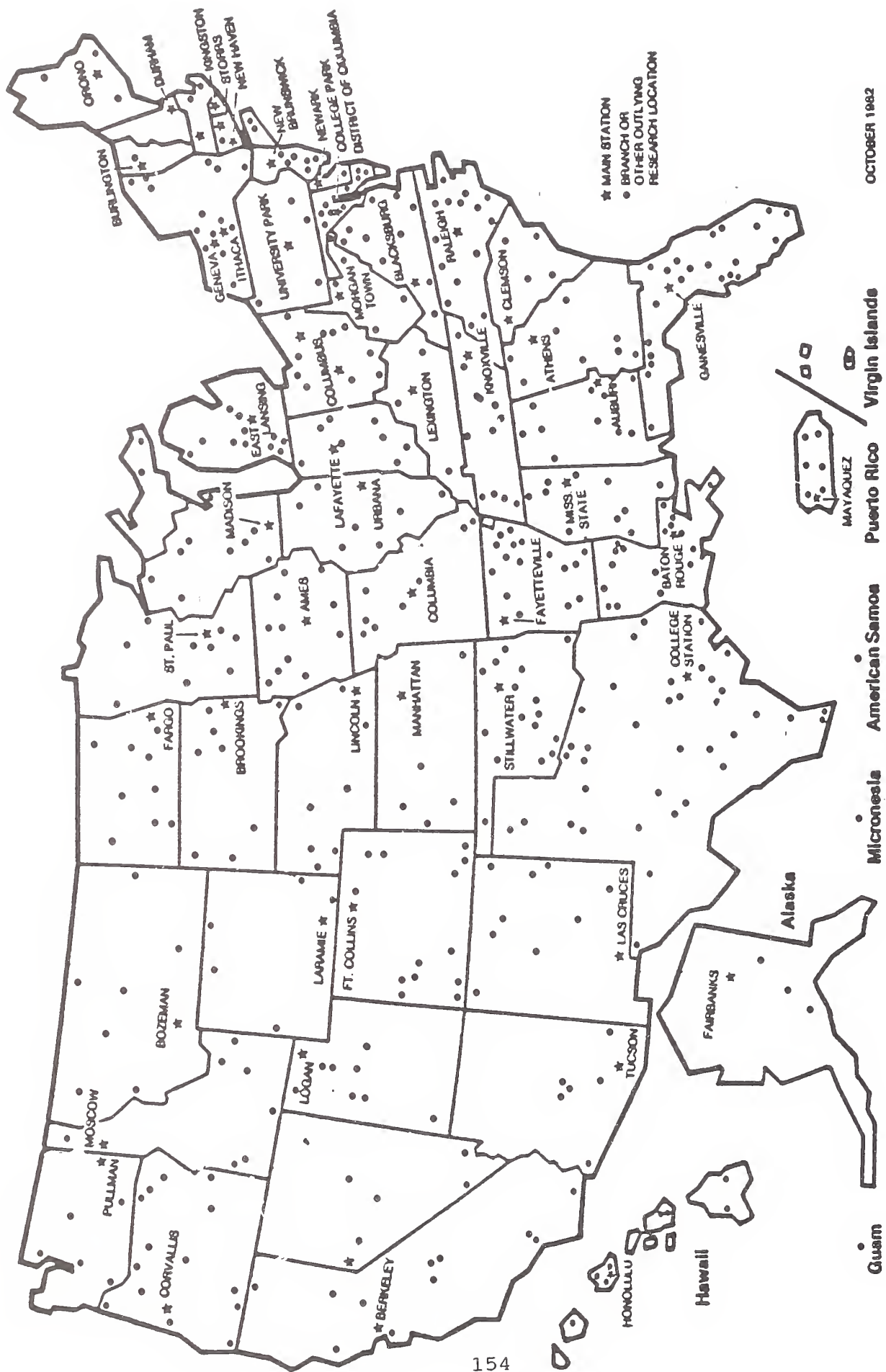


Figure 1. State Agricultural Experiment Station System (From USDA, Cooperative State Research Service)

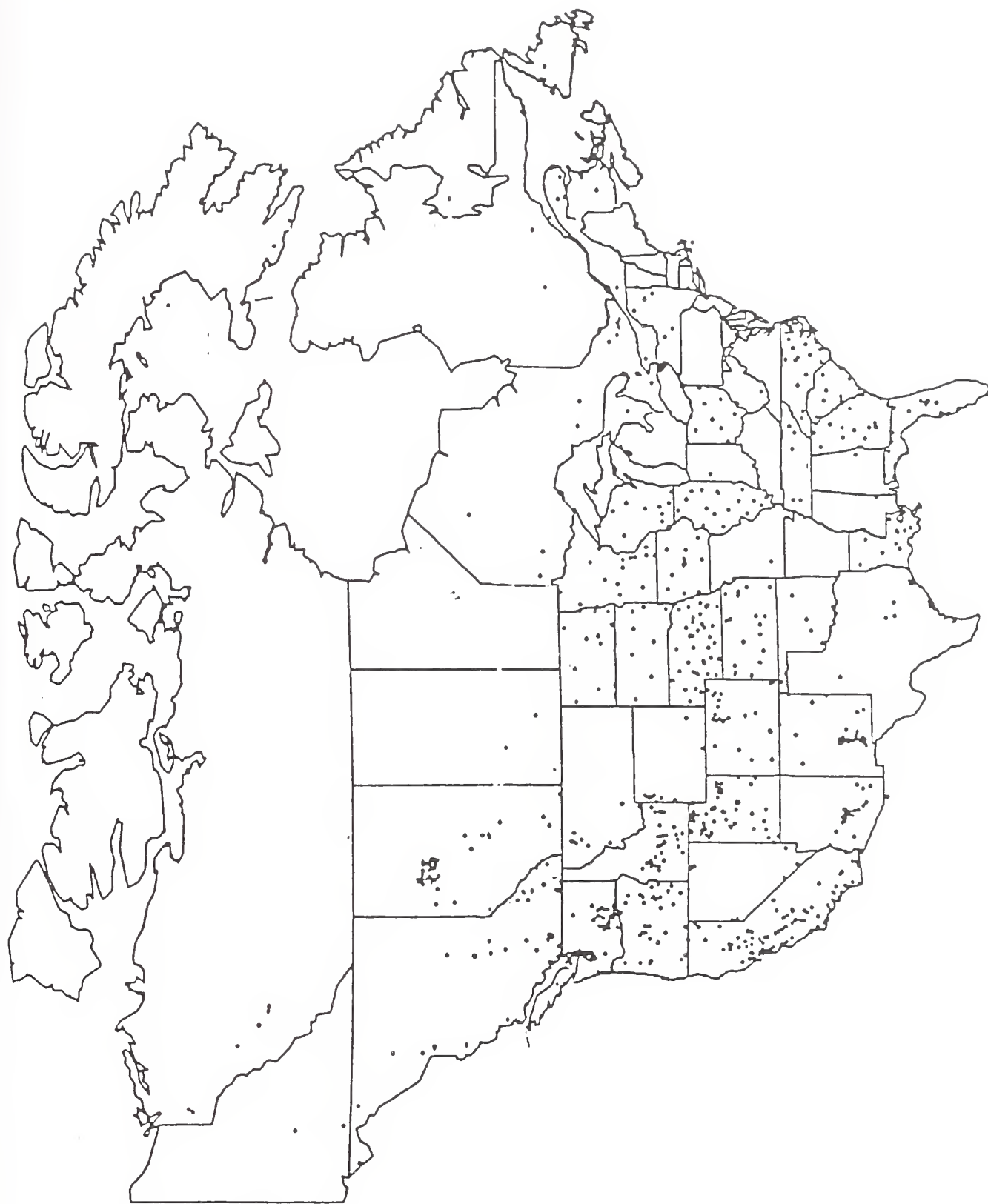


Figure 2. Stationary Automated Weather Station Locations (Meyer and Hubbard, 1992)

The proposed network would provide baseline historical data from a climatological perspective, yield data for testing biophysical models for assessing climate change impact and truly be representative markers and indicators of climate change.

Envirotron
National Controlled Environment Study Center(s)
To Better Manage Humankind's Activities in Harmony With Nature

The effect of global change on biological and terrestrial systems and the effect of these systems in buffering or intensifying climate change is understandably not well understood. The better our quantitative understanding of our planet's biophysical and agroecological systems, the better we are able to manage our activities and enterprises to minimize negative impacts upon the environment and take advantage of positive aspects of climate change. Controlled environment studies have a signal role to play in developing our quantitative understanding of these systems. These studies have, and should be, of special benefit in unraveling the particularly difficult issues related to understanding these systems.

Unfortunately, advances in facilities to study these complex systems and the necessary concomitant measurements, instruments, sensors and control systems have lagged so far behind that future discoveries are being jeopardized, or, at best, delayed for many decades. What is needed is a next generation controlled environment facility to quantify the many relationships that describe plant, animal and organismal responses to global change. To meet this need, the Agricultural and Biological Systems Team participants at a global change National Institute for Global Environmental Change (NIGEC) Conference¹ birthed the concept for a national study center(s) referred to here as a National Envirotron. Today's Phytotron and Biotron facilities do not allow for simultaneous control of atmosphere and rhizosphere variables. Of key importance for any new facility, because of expected increase of climate variability, will be the ability to simulate infrequent but extreme environmental conditions.

Many of the technological advances in this area have come from above-ground studies in controlled environmental facilities. The soil environment and its role in many ecosystems has, to a large degree, because of the lack of suitable facilities, been studied much less, and is poorly understood. Therefore, a priority for the Envirotron should be below-ground ecosystem studies. The role the soil environment plays is of considerable concern to several global change issues. The extent to which the global carbon balance is influenced by subterranean ecosystem dynamics is, for example, unclear. The Envirotron would help resolve soil ecosystem processes associated with carbon sequestration, soil organic matter and carbon released as methane or carbon dioxide.

The Envirotron would, out of necessity, be a "big science" undertaking supporting the biological, ecological and natural resource management sciences. It would likely be large in scale and costly in order to accommodate the diversity and complexity of appropriate studies and allow for a sufficient number of investigations to have a meaningful impact on scientific discovery and problem solving. The scope of studies should include a full range of diverse and representative ecosystems (e.g., tropical, desert, tundra, forest and wetlands ecosystems). It should have the capacity to accommodate open-air studies requiring considerable environmental control, as well as totally contained tagged trace gas release studies. It is envisioned that the Envirotron will be capable of facilitating studies that include long-term ecosystem comparisons and mammalian animal species.

1. Engineering Response to Global Change Conference, Palm Coast, Florida, June 1991, Sponsored by The National Institute for Global Environmental Change (NIGEC) with a grant from the U. S. Department of Energy.

Technologies for control, monitoring and measurement systems for such a facility are not now available. To bring these new technologies on-line will require the Envirotron be built in phases spanning, possibly, ten or more years. A consortia will be needed because of the large expense of the Envirotron and its complexity. Consortia participants might be the National Science Foundation, National Department of Defense and Energy laboratories, National Aeronautic and Space Administration and the USDA action and research agencies.

To assure that the best studies are undertaken, a long-term competitive grants program and a maintenance budget should be established to support multi-year, large-scale projects. From the outset, private sector and international participation should be encouraged. Also, consideration should be given to a modular development program with a distributed network of study centers and facilities. This might reduce costs, enhance utility and broaden scientific community participation and project support. The Envirotron provides a platform for aggressively pursuing the quantification of biophysical responses to changing climate. It should speed the progress of biophysical model development.

I would be remiss if the underinvestment in research from the USDA in instrumentation for monitoring and measuring were not mentioned. Outdoor, real-world studies are confounded by the complexity of the natural system and the many variables influencing them that must be measured and monitored. Underinvestment in this research has already diminished the number of laboratories and students with the intellectual capital to make tomorrow's advances. Opportunities to engage the national laboratories and private sector in non-conventional development programs in the instrumentation area should underpin the philosophical culture addressing the Envirotron.

Sustainable Agroecosystems

Sustainable agroecosystems respond to and affect climate change. Elemental to sustained agroecosystems is the need early-on to develop markers of sustainability. These markers or indices foretell of change and the magnitude of change. Air, water and soil quality, and those markers associated with biodiversity, are not well defined nor adequately understood. But they are the "barometers" and "thermometers" that, in the end, measure the effects of change on humankind.

Sustainable agroecosystems must, at a minimum, be economically viable and, simultaneously, be environmentally benign. Although market forces are increasingly placing value on environmentally sound activities and products, market forces are capricious and driven by short-term outlooks. The value of air, water and soil quality and biodiversity must surely be determined on a much different time frame than is common in traditional market-driven economies. The issue of economic value, in addition to being complicated by an unconventional reference time frame, is ultimately confounded by philosophical views on the value of life.

In the final analysis, all sustainability policy issues appear to be driven by economic market forces. The short-term market world-view is out of sync with global change and other environmental concerns that have inherently infinitely long time frames. A new world-view market economy is needed to guide longer time frame policies that are in harmony with nature.

Sustainable Agriculture and Natural Resource and Environmental Management (SANREM)

Just this year, the United States Agency for International Development (USAID) initiated a Cooperative Research Support Project (CRSP) entitled Sustainable Agriculture and Natural Resource and Environmental Management (SANREM). This five year, ten million dollar project, although not focused on global change, could have demonstrable effects on it. Several fundamental paradigms of the project give it relevancy to the global change issues facing agriculture. They give to the project an

unconventional, but extremely important, philosophic vision.

First and foremost is its global agenda. It recognizes that what is done or learned in one corner of the world has global implications. Therefore, the consortia of 31 project participants represent agencies, universities and entities with demonstrated expertise globally, coming together in a coordinated multidisciplinary problem-solving mode.

SANREM embraces a "farmer first" principle as the integrative component of society and resource management issues. It recognizes the farmer's adaptive and intellectual capacities to respond, innovate and help solve problems as full partners in developing and implementing the research agenda. It capitalizes on the private volunteer organizations (PVO) and the non-government organizations (NGO) to interface between technology development and transfer, and cultural considerations.

The project anchors itself to a landscape approach, forcing it to address scaling concerns both temporally and spatially. It addresses field level cultural and management issues but requires integration to the region, national and global borders. Problems and their solutions are scaled from the instantaneous event to seasonal, annual and longer periods.

SANREM highlights the complexities associated with sustainable agroecosystems. It emphasizes the interfacial relationship between social and technological concerns. This project, in its infancy, portends to be a model for tomorrow's resource and environmental management projects.

Global Biologically Integrated Sustainable Communities (GBISC)

An intriguing concept introduced at the Engineering Response to Global Change NIGEC Conference was the Global Biologically Integrated Sustainable Communities (GBISC) (Scott, 1992). This concept is based on the premise that local communities control nearly half or more of our nation's energy and resource consumption and therefore a challenge is to forge a sustainable entrepreneurship that combines energy, environmental, commercial and agricultural know-how and innovation. The concept focuses on a combination of science, engineering, technology, economics and social principles to "engineer" new ecologically sustainable communities. The objective is to design, develop and demonstrate ecologically sustainable communities (10,000 to 50,000 persons per community) and transfer this knowledge to the global community to guide land and resource development. The ingredients of GBISC are:

- a. biologically derived fuels,
- b. renewable energy systems,
- c. maximum recycling,
- d. energy conservation,
- e. low-energy transportation services,
- f. managed ecosystems, especially waste,
- g. compatible technologies (e.g., biotechnology and new materials),
- h. sustainable agriculture,
- i. infrastructure support, and
- j. advanced housing systems.

GBISC may be the capstone of systems analysis, requiring insights of physical sciences with those of biological and social sciences. Although there are a limited number of communities in different stages of developing viable approaches for sustainable communities, at this time, a GBISC does not exist to the level of the totally integrated concept.

GBISC is consistent with the CO₂ emissions proposed for 2015 in the Office of Technology Assessment emission scenarios (OTA, 1991) and is consistent with mounting global greening sentiments. America's green thinking mood sets a stage for serious consideration of, and commitment to, GBISC.

Portfolio of Assets

For the decades ahead, agriculture, and in particular agricultural research, will be challenged as never before by the expected growing world population combined with a more variable and uncertain future climate. The challenges are multifaceted and intertwined. The same must be true of the agricultural research agenda to accommodate this future.

Climate change prognostications initially alarmed farmers, ranchers, foresters and other agriculturists whose livelihoods rest solely on their crops and livestock exposed to the vagaries of the weather. In response to these worries, the Council for Agricultural Science and Technology (CAST, 1992) in its report answered the following question: For a warmer planet with more people, more trade and more CO₂ in the air, can U.S. farming and forestry prepare, within a few decades, to sustain more production while emitting less and stashing more greenhouse gas?

Their answer was two-pronged. First, farmers will adapt without outside encouragement to ease the impact of climate change. The success of adaptation will depend upon costs, trade flexibility and policies. They pointed out that adaptation by farmers requires sustained research to develop adapted crops, animals and management.

In addition to the resilience of farmers, ranchers and foresters to adapt, the report secondly recommends that the best way to hedge future cost of climate change is to hedge the risks by assembling a diversified portfolio of assets that can be brought to bear to adapt to climate change (Table 1). According to the CAST report, managing the nation's portfolio, means strengthening the nation's research capacity and broadening its agenda through new investments and changing policies.

The best chance for agriculture to respond to climate change is in accord with CAST's conclusion to manage its diversified portfolio wisely. As pointed out in the CAST report, diversity is essential because no one knows which asset will be needed most in tomorrow's climate. And even if the climate does not change, investments in the portfolio will yield dividends to America's agricultural enterprises.

Table 1. Portfolio of Assets to Prepare for Climate Change²

Asset	Value for Adapting to Climate Change	Policy Steps to Increase Flexibility
Land	Extensive cropland across diverse climates provides diversity for adaptation.	Reform agricultural policy to encourage flexible land use.
Water	Water, which already limits farming in some regions, is crucial for adaptation if climate becomes more dry.	Change institutions to encourage more prudent use of water. Raise the value of crop produced per volume of water consumed.
Energy	Reliable energy supply essential for many adaptations to new climate.	Improve the efficiency of energy in food production. Explore new biological fuels and ways to stash more carbon in trees and soil.
Physical Infra- structure	Facilities trade and input flows when market signals change.	Maintain and improve input supply and export delivery infrastructure.
Genetic Diversity	Source of genes to adapt crops and animals to new climates.	Assemble, preserve, and characterize plant and animal genes. Conduct research on alternative crops and animals.
Research Capacity	Source of knowledge and technology for adapting to climate change.	Broaden research agenda to encompass adaptation to climate change. Encourage private research on adaptation. Find farming systems that can be sustained in new climates. Develop alternative food systems.
Information Systems	Provide information needed to track climate change and adapt to it.	Enhance the nation's systems that exchange information. Encourage the exchange of agricultural research information.
Human Resources	Provide pool of skills enabling farmers and researchers to adapt to climate change.	Make flexible skills the hallmark of agriculture's human resources. Strengthen rural education systems, particularly continuing education.
Political Institutions	Determine the policies and rules that facilitate or hinder adaptation to new climates.	Harmonize agricultural institutions and policies.
World Market	Enables trade to mediate shifts in farm production and sends price signals that eventually adjust production to new climates.	Promote freer trade and avoid protectionism.

2. Council for Agricultural Science and Technology, Task Force Report No. 119, Preparing U.S. Agriculture¹ for Global Climate Change, 1992.

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Outlook '93

For Release Wednesday, December 2, 1992

**U.S. 1993 WHEAT PLANTINGS LIKELY UP,
MAJOR FOREIGN PRODUCERS MAY ALTER TRADITIONAL CROPPING PATTERNS**

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Summary**U.S. Wheat Plantings for 1993 Likely Up**

The 1993/94 U.S. wheat supply will largely depend on the size of the 1993 crop, as carryin stocks are forecast up only 50 million bushels from a year earlier. Plantings are likely to increase because of lower idled acres under government programs and stronger prices for winter wheat producers at planting time than a year ago. However, it is questionable whether the large 1992 spring wheat area will be maintained next year.

Yields in 1993 largely depend on the weather between now and harvest. However, a rebound in hard red winter yields from the below-average levels of the last 2 years would likely raise total winter wheat yields. On the other hand, a return to average yields would mean a sizable drop from the 1992 record yields for other spring wheat and durum.

**Production To Determine Supply As
Forecast Beginning Stocks Low Again**

Carryin stocks for 1993/94 are forecast to be 523 million bushels, up only 50 million from the relatively low level of a year earlier. Thus, any major changes in the 1993/94 wheat supply will largely depend on the size of production.

If the forecast for 1993/94 beginning stocks is realized, this

would be the third year of the last four when carryin stocks were less than 550 million bushels. Moreover, around 150 million bushels are expected to be tied up in Commodity Credit Corporation (CCC) inventory, mostly in the Food Security Wheat Reserve. This leaves 373 million bushels privately owned and more readily available to the market.

Relatively low beginning stocks mean that if problems arise with the 1993 crop, prices will rise and constrain use. However, if production is stable, 523 million bushel stocks would be large enough to absorb most unforeseen increases in demand.

The Acreage Reduction Program for 1993 will be zero, down from 5 percent in 1992. Higher market prices at winter wheat planting time likely also encouraged additional plantings. The unweighted average of this year's current national average wheat prices for June through October is \$3.22 per bushel -- \$0.51 higher than last year's unweighted average for the same period. The wheat price increase is even greater when measured relative to feed grains and oilseeds whose prices have been pressured downward by large 1992 crops.

U.S. Winter Wheat Production Likely To Increase in 1993

Winter wheat production in 1992 was 1.6 billion bushels, up from 1.4 billion in 1991, but down from 2.0 billion in 1990. Winter wheat production is likely to increase in 1993, especially in the Southern Plains, the heart of the winter wheat belt.

Area planted is likely to increase in some areas because of the lower ARP, although the increase may be limited by several factors. Reducing the ARP to zero from 5 percent is unlikely to produce as great an effect as a reduction from 15 percent to 10 percent, because the last acres of a farmer's base acres are often the most difficult to farm or the least productive. With Normal Flex Acres (NFA) where producers receive only market returns on 15 percent of their base acres, some farmers cannot justify planting these last acres, unless market prices are sufficiently high.

Another factor limiting the response in plantings to the lower ARP is the practice of some producers, particularly in Texas and

Oklahoma, of planting all or more than their base acres and haying or grazing-out the area that is greater than their permitted acres to be harvested for grain. Such producers would likely harvest more wheat because of the lower ARP without changing their planted area.

Prices this fall have favored increased winter wheat plantings. The U.S. average price received by farmers in August and September 1992 were 38 and 41 cents per bushel higher than a year earlier, while corn prices averaged 18 cents per bushel lower, and soybeans were down 29 and 37 cents per bushel. Wheat prices increased from August through November, during planting, as they did a year earlier. Feed grain and oilseed prices tended to decline from August into November as record corn and soybean yields were becoming apparent. Cash market prices and futures prices for nearby months and next year also favored wheat over alternative crops.

These price relationships likely encouraged some winter wheat farmers to plant wheat on other program crop's flex acres and more on wheat flex acres. Moreover, if a producer left some flex acres idle last year, this year's stronger wheat prices at planting may encourage additional acres, especially if moisture conditions were favorable.

Moisture conditions may be too wet, however, in some areas. Especially in the Eastern corn belt, excessive rains and a late corn harvest likely prevented some producers from planting as much wheat as they had intended. However, SRW producers usually respond to comparative prices more than other wheat growers, so SRW area will likely increase, especially in areas which had good yields and quality in 1992.

As is often the case, planting conditions for winter wheat were mixed this fall, with some areas suffering from problems, especially dryness in Texas and the western parts of Oklahoma and Kansas, while other regions, particularly parts of Kansas and Arkansas, had better than normal conditions. By November 1, 1992, 90 percent of the winter wheat crop in the 19 major States was planted, only 1 percent behind normal, and 74 percent of the crop had emerged, 5 points less than normal with Oklahoma and Texas lagging the most.

Crop conditions were about average overall, with Kansas better than normal with 40 percent of the crop rated excellent, while about a third of the Texas crop was rated poor or very poor. The average overall planting conditions are a significant improvement from a year ago when extended dryness in October was followed by torrential rains in November.

Good planting conditions in most of Kansas likely facilitated increased planted area, while dryness in Oklahoma and Texas may reduce plantings meant for grazing more than area planted for grain.

Unless growing conditions are unfavorable, a higher percentage of the winter wheat planted area may be harvested for grain in 1993. The zero ARP should encourage farmers who overplant to harvest a larger share of planted area, as payment and permitted acres increase. Moreover strong wheat prices should encourage producers to harvest wheat and market the grain. However, as usual, the major factor in the harvested-to-planted ratio will be weather. Winterkill is a common cause of abandoning or reseeding winter wheat to another crop, or in the case of the Pacific Northwest, reseeding to spring wheat.

Yields in 1993 largely depend on the weather between now and harvest. Winter wheat yields in 1992 were mixed, with the largest class of wheat, hard red winter (HRW), posting below average yields (33 bushels per acre for the second year in a row), while the class grown in the Corn Belt and the East, soft red winter (SRW), had record average yields. If yields return to average or trend levels in 1993, increased HRW production would likely overwhelm any change in SRW, boosting winter wheat production.

Spring Wheat Production Unlikely To Match 1992 Record

Prospects for spring wheat area planted in the spring of 1993 are unclear. Reduced ARPs (zero for both wheat and barley) provide a base for expanded plantings of both in 1993. However, wheat prices are unlikely to be as high at planting time in 1993 as they were in 1992. In March 1992, when spring wheat producers were making planting decisions, the farm price averaged \$3.72 per bushel, nearly a dollar a bushel higher than in September 1991,

when winter wheat producers were making their planting decisions.

Unless winter wheat crop conditions deteriorate significantly, or unforeseen demand increases occur, wheat prices will not be as high as in early 1992. Moreover, feed grain and oilseed prices usually rebound from their harvesttime lows.

Spring wheat competes with barley and sunflowers for acreage in the Northern Plains. The large increase in hard red spring (HRS) area in 1992 may have used up much of the easily available land. Spring wheat area planted will likely respond to the condition of the winter wheat crop as it comes out of dormancy. Winter wheat production problems and strong prices would encourage spring wheat producers to take advantage of the lower ARP and maintain or increase wheat area.

Spring wheat yields in 1993 will be hard pressed to match 1992. Yields in 1992 broke previous records by a wide margin. HRS average yields are estimated to have reached 40.9 bushels per acre, 4.8 bushels higher than the previous record HRS yields and topping the 1983 record HRW yield by 1.2 bushels. Average HRS yields have proven extremely variable in recent years, ranging as low as 18 bushels per acre 5 years ago when drought devastated the crop. A return to average or trend yields would imply reduced spring wheat production.

Some Major Foreign Producers Likely to Alter Cropping Patterns

The Northern Hemisphere's winter wheat crops mostly have been planted. Planting conditions were generally favorable. However, economic transitions and policy changes in many countries might lead to lower plantings for 1993/94.

USDA will make its first 1993/94 projections in May 1993. However, it is not too early to describe some of the economic and political factors that might have affected winter wheat planting decisions and the weather conditions at planting that might affect the final outturn of the 1993/94 winter wheat crop.

Changes in the EC's Common Agricultural Policy (CAP), continuing economic transitions in East Europe and the former Soviet Union (FSU), the shift to a more market-oriented agricultural sector, in

China are likely to lead to shifts in traditional cropping patterns. In addition, austerity programs in India could have affected 1993/94 wheat plantings.

The EC recently adopted dramatic changes in its Common Agricultural Policy that will be phased in over a 3-year period beginning in 1993. The basic components of the program include set-aside provisions for large farms (those capable of producing more than 92 tons of cereals), about a 30-percent reduction in intervention prices by 1996 (depending on the grain), with the largest drop occurring in 1993/94. Oilseed support prices have been eliminated under the reform of the oilseed regime which has already gone into effect and oilseed prices could drop sharply. Farmers will receive compensation for the reduction in intervention prices through direct payments. However, large producers are required to set aside a specified portion of their arable land in order to receive payments for grains, and all farmers must meet the set aside requirements for oilseeds to receive oilseed payments.

While it is not known how EC producers will react to the CAP changes, wheat's consistently high yields lead many analysts to conclude that expected returns will favor wheat over other grains and oilseeds in many areas.

Only wheat meeting specific milling standards will be accepted into government intervention stocks, increasing the incentive for farmers to plant varieties more suitable for milling than for feed. This is expected to affect production in the United Kingdom the most. Farmers in the UK have been able to boost production in recent years by planting high yielding, low quality varieties. Because of the UK's climate, it will be more difficult for UK producers to meet the new intervention quality standards.

The reduction in grain prices is likely to increase domestic demand for grain, particularly for feed. At the same time, the retail price of meat is expected to decline, leading to greater demand for livestock products. This, in turn, will increase demand for grains for feeding. Increased feed demand is likely to support prices for wheat that does not meet intervention quality standards, especially since feed barley prices will still

be supported because it can enter intervention stocks.

Winter wheat in the EC is planted between September and mid-November. With many details of the reform still unclear, farmers had to make their planting decisions based on an unusually large degree of uncertainty about expected returns from alternative crops. However, it was probably very difficult for farmers to estimate what their relative returns would be given the announced changes in price support, uncertainties regarding the demand for feed grains, currency fluctuations, and changes in EC Monetary Compensation Amounts (MCA). Thus, they knew that they had to set aside 15 percent of their arable land to qualify for compensatory payments. They also knew what the support prices would be and that grain would still be accepted into intervention.

Very little information on EC plantings for the 1993/94 crop is available. It has been reported that winter rapeseed acreage is down 25 percent from a year ago. Some of this area may have been planted to wheat. Because of wheat's higher yields, wheat has an advantage over barley. Therefore, it remains uncertain how much, if any, wheat plantings will decline. In addition, UK producers are reported to be planting more milling quality wheat varieties than a year ago, a shift that might cause downward pressure on UK yields in 1993/94.

It is still not clear what impact the changes will have on yields. The reduction in intervention prices will provide an incentive for producers to reduce costs by cutting back on fertilizers and pesticides. However, some analysts think that this will have little impact because farmers have been using too much fertilizer and chemicals. The change in intervention standards might also cause farmers to shift to higher quality, lower yielding wheat varieties. But high yielding milling wheat varieties have already been developed and their use is expanding rapidly in France.

Planting conditions in the EC and the other western European countries were favorable. In southern Europe, heavy rains provided abundant moisture, although they delayed planting in some areas. Warm temperatures allowed late planting and good crop establishment. In northern Europe, rain and temperature conditions were favorable in the UK, northern France, and the

Benelux countries. In Scandinavia and northern Germany, which suffered from serious drought last spring and summer, rain improved topsoil conditions enough for planting and germination, but those crops will need additional precipitation throughout the year.

Grain area has been declining in Eastern Europe in response to the ongoing economic transformation. The steep decline in livestock inventories has reduced feed demand, costs of production are rising, and grain prices have failed to keep up. Land reform efforts in some countries, especially Romania, are breaking up large farms into small individual units, causing shifts in cropping patterns. While very little information regarding winter grain planting in Eastern Europe is available, drought lowered 1992/93 spring grain production and boosted feed grain prices. This might stimulate farmers to plant additional acreage to grain, slow the decline in grain area, or, perhaps, stabilize area in 1993/94.

In the FSU, precipitation across the region improved the soil profile even in areas hit by drought during the summer. However, spring grain harvest was delayed and, as a result, winter wheat planting in some areas occurred much later than normal. Adequate precipitation and normal temperatures allowed the crop to become well established prior to entering dormancy. It has been unusually warm in the southern areas, allowing the crop to become very well established.

Grain area has been trending down in the FSU since 1980 as more marginal areas have gone into forage crops or left fallow. Following this trend and exacerbated by late plantings, winter grain area is expected to fall. At a recent agricultural conference in Moscow an official reported that an estimated 3 million fewer hectares of winter crops were planted in the Commonwealth of Independent States (FSU-12, less Georgia) this fall than a year ago. The loosening of the command economy and rising costs of production relative to grain prices (due to higher input prices and reduced subsidization) are also contributing to the process of taking land out of grain production.

This summer, drought affected the North China Plains where much

of China's winter wheat is grown. However, as in Europe, recent rains have alleviated some of the dryness, providing enough moisture for planting and germination. More rain is needed, however, to recharge the soil profile, reservoirs, and aquifers. China's other winter grain areas received adequate moisture for planting and the crop is well established.

China is undergoing a massive economic transformation. Farmers still will have to meet government quotas for wheat in 1993/94. However, the provinces are putting much more emphasis on profitability of farms, of grain bureaus that purchase grain, and of all aspects of distribution and marketing.

It is possible that grain bureaus are trying to reduce stocks. One result is that farmers are likely holding increased stocks and prices could be lower than they would be otherwise. Low farm prices, provincial pressure to plant "economic" crops (such as fruits and vegetables) and uncertainty regarding the outcome of the transformation might lead to a decline in winter grain area. Since 1990, the government had been pressuring farmers to increase wheat area. Government pressure to produce grain has diminished and the ability of the government to influence farm decisions has declined. Wheat area in 1993/94 is not expected to increase, although strong consumer demand may prevent a significant decline.

Budgetary pressures in India led to a 30 percent decrease in fertilizer subsidies. The government is compensating farmers somewhat for this increase by raising support prices, but yields could still be affected. Most of India's and Pakistan's wheat crops are irrigated. The crops are planted between October and December. The 1992 monsoon started late and initially was erratic, causing concern about the adequacy of irrigation supplies. However, the monsoon picked up and while precipitation remains below normal for the year, prospects appear favorable. Dry conditions are still causing some concern, however, in Bihar and eastern Uttar Pradesh. Good rain in October and September, however, allowed the crop to be planted and become established in those regions as well as in the Punjab.

Finally, winter wheat prospects are mixed in North Africa. Eastern Algeria and Tunisia recently received recent soaking

rains, allowing the crop to be planted and become well established. However, Morocco and western Algeria remain dry. Planting there has been delayed; but planting normally occurs between November and December. These countries receive most of their precipitation over the winter, so the amount of rain received in the coming month will be critical.

1992/93 U.S. Wheat Use Forecast Up

U.S. export sales in 1992/93 surged in the second quarter as quality concerns about the Canadian crop surfaced, and following the announcement of a large EEP program, a new credit package for the FSU, and larger-than-usual wheat donations.

U.S. food use is expected to increase in 1992/93 after stagnating in 1991/92. Feed and residual use may nearly match a year earlier despite higher wheat prices relative to feed grains, possibly because of extensive rains during harvest.

A forecast increase in 1992/93 U.S. stocks is concentrated in HRS. Ending stocks of all other wheat classes are expected to be smaller than the historically low beginning stocks.

All wheat: Supply and disappearance 1/

Year beginning June 1	1988/89	1989/90	1990/91	1991/92 Estimated	1992/93 Projected
----- Million bushels					
Beginning stocks	1,261	702	536	866	472
Production	1,812	2,037	2,736	1,981	2,459
Imports	23	23	36	41	50
Supply, total	3,096	2,762	3,309	2,888	2,981
Domestic					
Food	726	749	785	785	835
Seed	103	100	90	94	98
Feed and residual	150	144	499	257	250
Domestic, total	979	993	1,375	1,135	1,183
Exports	1,415	1,232	1,068	1,281	1,275
Disappear. total	2,394	2,225	2,443	2,416	2,458
Ending stocks	702	536	866	472	523

Wheat by classes: Supply and disappearance 1/						
Year begin. June 1	Hard red winter	Hard red spring	Soft red winter	White	Durum	Total
----- Million bushels						
1991/92 (Estimated)						
Begin. stocks	360	277	80	87	62	866
Production	902	431	325	219	104	1,981
Supply, 2/	1,262	725	405	311	185	2,888
Domestic use	509	217	259	65	85	1,135
Exports	558	380	105	193	45	1,281
Use, total	1,068	597	364	258	130	2,416
Ending stocks	194	128	41	54	55	472
1992/93 (Projected)						
Begin. stocks	194	128	41	54	55	472
Production	966	702	427	266	97	2,459
Supply 2/	1,161	852	468	327	173	2,981
Domestic Use	495	295	210	98	85	1,183
Exports	480	345	225	185	40	1,275
Use, total	975	640	435	283	125	2,458
Ending stocks	186	212	33	44	48	523

1/Includes flour, products in wheat equivalent. 2/Includes import

RICE:

Near-Record 1992 U.S. Production Boosts Supplies

U.S. 1992 rice production is forecast to increase 9 percent from a year earlier to 168.2 million cwt. This is the largest U.S. rice crop since 183 million cwt in 1981.

Harvested area is up a projected 8 percent because of a 0 percent ARP, compared to 5 percent in 1991; favorable weather and relatively high prices at planting time; and increased water availability in California. National average yields, forecast at 5,666 pounds per acre, up from last year's 5,617.

U.S. 1992/93 rice supplies are projected up 9 percent from a year ago to 201.1 million cwt. This is the highest since 1986/87 when record stocks contributed significantly to record supply. Higher production, beginning stocks and imports boost forecast supply.

The forecast increase in supplies and recent lowering of international prices and USDA's announced world rice price is putting downward pressure on U.S. prices. Rice prices at the farm level are forecast to range between \$6.10 and \$6.60 per cwt in 1992/93, compared with an estimated \$7.53 for 1991/92.

With 1992/93 supplies expected to be higher and prices lower, U.S. exports are projected up 11.5 percent from last year. Increased supplies and lower prices are expected to improve U.S. competitiveness in the high-quality markets in Europe, the Middle East, and Latin America and also are likely to lead to more rice for the P.L. 480 Program, potentially boosting exports to Latin America and Africa. U.S. domestic use continues to grow, but slower than in the late 1980's. With growth in supplies forecast to exceed growth in use, 1992/93 carryout stocks are expected to increase to 33.1 million cwt, 21 percent above 1991/92.

World rice trade in calendar 1993 is expected to decline. Forecast lower Indonesian imports account for the majority of the decline. Fierce price competition is expected to dominate world trade in 1993. A second large crop in as many years and lower prices should permit Vietnam to make inroads into Thailand's share of the low-quality long-grain rice market.

Outlook '93

For Release: Wednesday, December 2, 1992

PROSPECT FOR TRADE WITH THE FORMER USSR STATES**Steven A. McCoy**
President, North American Export Grain Association**Introduction**

Ladies and gentlemen, it is pleasure to join you today. My thanks to the moderator for her kind introduction.

I am Steve McCoy, President of the North American Export Grain Association (NAEGA). I have been asked to offer a few, brief comments on the topic: "Prospects for Trade with the Former USSR States".

Trade Results

I regret that I have no exciting propositions or predictions to offer this audience today.

Future wheat trade prospects in the FSU States are mixed. Immediate conditions affecting U.S.-FSU agricultural trade have become more difficult in recent months (and in recent days), as a result of complications affecting the GSM program. However, it is difficult to predict how these problems may yet affect wheat exports in 1992/93.

Last year saw a buoyant market for U.S. wheat, which resulted from a substantially reduced FSU harvest; low wheat prices; and delays in U.S. credit, which favored purchases of U.S. wheat over purchases of U.S. feed, despite a pressing shortage of feed for animal production.

Not all of these conditions are present this year; therefore, one would expect wheat trade to return to more normal patterns.

For the future, it is said, U.S. wheat exports to the FSU may be seriously eroded, if policies currently underway in the FSU are successful in encouraging greater efficiency and production in the wheat sector by: (1) realigning terms of trade affecting farmers; (2) improving wheat quality; and (3) providing adequate incentives to farmers to ensure deliveries of wheat to central government procurement channels, which continue to provide the largest market for grain produced in the region.

All of the above, of course, represent a leap of faith, given

current political and economic conditions in most of the Republics of the FSU.

A process of reform and "privatization" is underway in Russia and the Baltic States (and to a lesser degree elsewhere); but it has yet to make major inroads on the system of grain production and procurement that preceded the demise of the USSR.

The truth is that no one really knows what can reasonably be expected of FSU agriculture in the future. Therefore, it is difficult to be declarative about the prospect for U.S. trade. That prospect, still, is intimately related to prevailing crop conditions, and agricultural procurement and distribution policies, in the each of the Republics. Those conditions, and those policies, are, obviously, always subject to change.

Credit and Food Aid Assistance

We do know that availability of U.S. credit now forms a perimeter of expectation about what can, or cannot, be exported to the FSU Republics qualified to receive such credit (currently Russia and the Ukraine). Available food aid resources provide a similar limit on wheat trade with other, non-credit qualifying countries (among which the balance of FSU Republics currently appear).

The principal determinant, today, of U.S.-FSU grain flows is the availability of U.S. government financing.

Some small portion of total trade may result from irregular or intermittent (and small scale) cash purchases; or, more prominently (but still intermittently), by barter transactions involving U.S. or foreign intermediaries.

However, the bulk of trade is still conducted with (essentially) state-run enterprises (such as Roskhlheboproduct, in Russia, or the Ukrainian Ministry of Bread Products); utilizing previously state-owned (and now "privatized") importing entities (such as Exportkhleb in Russia and Central Asia, and Ukrimpex and Belagointorg in Ukraine and Belorus); relying on U.S. government credit or food aid; the repayments of which are underwritten by state Finance and banking authorities (which are part of the government of which all the FSU parties to the transaction are, or were, once part).

Patterns of Procurement

This pattern, though decried by some who favor greater privatization, is unlikely to be immediately altered in the foreseeable future.

One reason is that enterprises, such as Exportkhleb, currently

corner the FSU market on existing (and necessary) importing and marketing expertise. Another reason is that their major customers -- the State procurement agencies and the governments of which they are part -- still control the elevators, mills and bakeries which provide the bulk of the grain-based products available to consumers throughout the FSU.

Regarding credit, only procurement agencies -- or their political masters -- currently have the authority to decisively intervene in disputes with finance officials regarding allocation of scarce hard currency. Their ability to do so is undergirded by their obvious significance and influence as political entities: Roskhleboproduct, for example, employs 500,000 persons.

These are our principal partners in the current U.S.-FSU trade. Provided that they can continue to convince finance officials to also do so, they will remain committed to some level of U.S. imports, if only as a hedge against disruptions in domestic supply occasioned by the problems which, we have seen, currently affect the FSU grain production and distribution system.

Problems of Internal Distribution

In fact, these problems have been severe in recent years. Poor planting and drought conditions crippled production in the FSU in 1991; however, the overall grain supply picture was further complicated by a refusal by farmers to surrender grain stocks at devalued, state-fixed ruble prices; and by the deteriorated pattern of inter- and intra-Republic trade.

Regarding the first problem, Russian officials, at least, have moved in recent months to offer farmers two-tiered prices that more closely resemble prevailing world prices; and assure a greater likelihood of delivery. As a result, deliveries to central inventories improved substantially in 1992.

The second problem is more intractable. Grain short-1991 saw actual embargoes affecting grain movements across Republic borders -- and within regions of the same Republic. This was despite agreements that existed between Republics regarding supply obligations; and regardless of obvious and pressing humanitarian need in some Republics (Tadjikistan is a prominent example).

There can be no question that the relationship between the Republics has soured following the 1991 overthrow of the Soviet regime. National rivalry, and ethnic pride, play an important role in this scenario; however, disputes over money, in 1991, played an equal, if not greater, part in the problems that emerged.

Increasingly, supply agreements are now being denominated in dollars (or convertible rubles). Some Republics are, in addition, introducing their own currencies (further complicating the trade

environment). The ruble crisis has affected all aspects of inter- and intra-FSU trade.

Efforts by the Russian government -- with Western help -- to stabilize the ruble may yet solve some of these problems. In the meantime, FSU patterns of trade remain disrupted; there is a visible enmity in relations between many of the Republics.

The Future

What, then, does all of this portend for the future of FSU agriculture and U.S. trade?

It means, I believe, that it is unlikely that the FSU will soon emerge as a net exporter of wheat (which is the principal concern of many in this hall).

Despite intra-Republic conflict, exports from grain surplus countries such as Ukraine and Kazakhstan are still more likely to be absorbed in intra-FSU trade than they are in international trade. Other countries and regions of the FSU will continue to be grain deficit,. Russia, may yet approach self-sufficiency in wheat. However, current supply and wheat quality considerations tend to mitigate that likelihood. Provided foreign credit is available, Russia should continue as a significant market for U.S. wheat for some time to come.

Of course, none of the above takes into account the possibility that by process of reform, stabilized macroeconomic conditions could rapidly increase efficiency in the Russian wheat production system. This process might also be served by more rapid and thoroughgoing privatization of the grain procurement and distribution complex.

That is because I do not believe this will happen soon.

Recent agricultural policy in Russia, in particular, has seen the triumph of limited political expediency over wider economic need. Care has been taken to avoid offending rural populations. These populations are conservative by nature; and have not (so much as their urban counterparts) embraced the premise of economic reform. State-controlled agriculture remains a source of employment for many millions in the FSU; political leaders will not, without some sense of trepidation, move quickly to awaken that sleeping giant.

Conclusion

On the above grounds, then, future U.S. wheat trade with the FSU should be temporarily secure. A greater risk to that trade rests with political and governmental developments in the United States than it does, necessarily, with conditions of production or

reform in the FSU.

There is, however, a need to maintain strong and vocal support for current, and, likely, future programs of assistance to the FSU States.

I have simplified the question drastically; and for that I apologize. However, I want to honor my time constraint; and I am happy to answer any questions you may have regarding the "Prospect of Trade with the Former USSR States".

Outlook '93

For Release: Wednesday, December 2, 1992

NEW CHALLENGES FOR U.S. WHEAT FARMERS

Neal Fisher

Deputy Administrator, North Dakota Wheat Commission

Good morning. It is a pleasure to appear on the program of this prestigious conference as we look forward to the challenges and opportunities that lie before us. U.S. wheat producers will certainly find the next several years to be a challenging period, shaped largely by international events.

Some of the challenges that we'll discuss may not be considered "new." Several have been with us in one form or another for some time. However, I would like to discuss some of the opportunities and problems that will affect the ability of U.S. farmers to produce and market their products.

The world has changed considerably in recent years with borders being redrawn and new nations emerging. When I worked in what we now refer to as the former Soviet Union some 15 years ago, I would not have dreamed of witnessing even a small percentage of the change that has transpired there and in Eastern Europe in a few short years.

The entire process, in addition to being awe inspiring, creates considerable opportunity in the form of new markets for U.S. goods. These events also present challenges, since some of these new entities will eventually evolve as competitors. Others may surround themselves with such serious trade barriers that potential export opportunities will ultimately prove to be disappointing.

Here at home, farm units will continue to grow larger, seeking greater efficiency in order to remain competitive with producers in other exporting nations. Rapidly advancing technologies will play an increasing role in production, marketing and management decisions. These are challenges that will not only change the way we do business, but will also change the structure and lifestyles in rural America.

U.S. producers face growing emphasis on environmental and food safety concerns as these issues take on greater prominence and public awareness. We live in an increasingly urban nation represented by an ever more urban Congress that has less direct contact with agriculture than ever before. Soil, water, wildlife and other conservation concerns, along with greater interest in the safe and appropriate use of fertilizers and pesticides, will likely gain greater attention in the years ahead.

Producers certainly recognize the significance of these issues and have been conscientious in their individual operations, as they continue to produce the most abundant and safe food supply in the world today. Society must keep in mind, however, the associated costs and economic impact of additional regulations on the ability of U.S. farmers to competitively produce a continued supply of safe and healthy foodstuffs. Added costs of production also inhibit our ability to compete with other countries, where food safety may be a lesser concern.

The food safety issue takes on added significance in an era of expanded trade agreements. As foreign products gain greater access to U.S. markets, the U.S. production sectors must be even more efficient or U.S. products risk serious displacement. Yet many of the foreign products we compete with are produced with little attention to safety for either the consumer or the environment.

The new administration presents a number of variables to U.S. producers. The most basic lie in the area of cabinet selections and the staffing of related agencies that influence agricultural and trade policy. Environmental policy appears to be a higher priority than it may have been in past administrations.

President-elect Clinton has indicated that he supports free and fair trade and will continue with a market oriented approach to agricultural policy. U.S. wheat producers will need all of the market opportunities they can muster in today's fiercely competitive trade environment. The EEC, Canada and other exporting nations continue to use a variety of export subsidy schemes to expand their own market shares at the expense of U.S. producers.

The Export Enhancement Program (EEP) in combination with GSM 102 and 103 credit guarantees continue to be the most effective tools currently available to U.S. wheat producers in their attempt to remain competitive in the world market. The concept of a marketing loan for wheat also appears to be a distinct possibility for the 1993 wheat crop in the absence of a GATT agreement. However, the conventional wisdom concludes that EEP will remain a necessity in maintaining a competitive advantage for U.S. products in a number of markets.

Current language depicting the 1993 wheat marketing loan implies a rather modest loan level that is not likely to make major market inroads or pay large sums to U.S. producers. However, the concept has merit in that it addresses the need to remove or lessen the targeted approach of the current EEP program. This "targeting" feature has slowed U.S. export transactions to the point that sales opportunities have been lost. Regular customers have been placed at a disadvantage to those who shop around. Countries that take wheat from the EEC and other known subsidizers can qualify for EEP authorizations, while loyal U.S. wheat customers cannot.

The concept has additional merit in that it would reduce the incentive for Canadian and other foreign wheats to move into U.S. domestic markets. A marketing loan would tend to reduce the difference in market prices paid by domestic processors and importing countries, while at the same time maintaining payments to U.S. producers.

The EEP program is a virtual necessity in exporting U.S. wheat to a sizeable number of large, price-conscious markets. However, on the negative side, EEP has complicated U.S.-Canada trade matters via the disparity between world and U.S. wheat prices. Increasing quantities of Canadian wheats have entered the U.S. market in recent years, because wheat and durum prices are comparatively higher on the U.S. side of the border. Shipments of Canadian wheat to U.S. destinations reached a record 1.0 million tons last year.

U.S. producers are anxiously awaiting the decision of a bi-national panel on a chapter 18 dispute over Canadian durum exports to the United States. The panel is expected to rule next month on U.S. producers' claim that Canadian wheat and durum is moving to U.S. destinations at prices less than acquisition costs -- in violation of Section 701.3 of the U.S.-Canada Free Trade Agreement. In the words of the U.S. Trade Representative, it appears the U.S. producers have a "good case."

In a related matter, legislation was introduced in the last session of Congress to establish end-use certificates on shipments of Canadian wheat, durum and barley to U.S. destinations. The measure, which mirrors Canadian provisions already in place -- tracking U.S. grains that move to Canada -- is designed to ensure that Canadian grains are not exported from the United States under taxpayer funded programs such as EEP.

The broader area of trade policy presents a number of additional challenges. Since the GATT process remains troubled at best, maintaining a competitive edge in key markets is critical. The EEC and other countries continue to dump heavily subsidized production into a growing number of markets. Backing away from any of the current programs or favorable trade policies that ensure U.S. market shares would prove very costly to wheat markets, producer prices and any leverage that U.S. negotiators have developed in the multilateral round.

Two of the largest markets for U.S. wheat, China and the former Soviet Union, require special attention if favorable trading relationships are to be maintained. Together these two market giants imported nearly 14.0 million tons, or nearly 40 percent of all U.S. wheat exports in 1991-92. The former Soviet republics (CIS or FSU) represent one of the largest export outlets for U.S. wheat that exist today. These republics, including the former Baltic states, Russia, the Ukraine, Belarus and others, collectively import in excess of 6.0 million tons of U.S. wheat annually.

The movement toward more democratic systems in the FSU and in other parts of Eastern Europe requires continued assistance from the West. More specifically, the U.S. must maintain the flow of export credit accompanied by favorable trading terms if we want to avoid a return to a harsher form of government. This should eventually include Most Favored Nation trade status for the individual republics of the former Soviet Union.

It is clear that maintaining a reasonable food supply in the FSU is an absolute necessity if efforts toward reform are to survive. GSM credit guarantees and EEP are the only tools currently available to effectively accomplish these goals. U.S. wheat producers benefit from these programs of course, but the United States as a country will also reap substantial benefits through reduced military expenditures, increased national security, and expanded trade opportunities if the reform process is sustained.

In China we find the largest single market for U.S. wheat with annual imports of 6.2 million tons over the past five years. However the continuation of U.S. wheat sales to this important market hinges on maintaining China's most favored nation (MFN) trade status. MFN for China was strongly supported by the Bush administration. President Bush concluded that maintaining MFN was a key element in changing the Chinese government's attitude on human rights.

President-elect Clinton is not viewed as a strong supporter of MFN for China. His stance has created considerable concern in the minds of U.S. wheat producers. The MFN renewal debate, which arises each June, has become increasingly difficult. Legislation placing restrictions on China's MFN has been passed in both houses of Congress in the last two sessions, but was eliminated by presidential veto. These restrictions, which risk severe retaliation by the Chinese in the form of sharply reduced U.S. wheat purchases, are not as likely to be vetoed by the Clinton administration.

A greater potential concern is that such sentiment might assist those who have long sought to place restrictions on countries that export textiles to the United States. This potential development particularly concerns wheat producers since 40 percent of all U.S. wheat exports move to destinations that in turn export textile products and footwear to the United States. Unrestricted access to these and other markets is taking on even greater importance as our world becomes smaller and more and more competitive.

In the area of specific trade agreements, U.S. wheat producers have expressed guarded optimism in their review of the current NAFTA text. There is potential over time for U.S. wheat exports to Mexico to increase. The population of Mexico is growing rapidly and wheat food consumption is expected to increase accordingly. However, many serious questions remain unanswered.

For example, NAFTA at one time was viewed as an opportunity to correct some of the imperfections of the U.S.-Canada Free Trade Agreement (FTA). Producers have instead been disappointed to find that their concerns over price transparency, and Canadian rail freight subsidies have not been addressed in the NAFTA text. Canada continues to undersell U.S. wheat in the world market with the aid of substantial freight subsidies and the administered pricing practices of the Canadian Wheat Board.

These basic incompatibilities in the marketing systems of the United States and Canada have created major problems for U.S. spring wheat and durum producers, even in their own domestic markets.

In addition to the issues left unaddressed in the FTA, the Canadian government has negotiated its own bi-lateral agricultural agreement with Mexico, outside the framework of NAFTA. Since the CWB is less likely to be held accountable for questionable trading practices under these circumstances, the situation leaves the U.S. producer in serious doubt of the eventual benefits of NAFTA.

The CWB is currently able to undersell U.S. wheat in the Mexican market despite obviously longer shipping times and higher ocean freight charges that should be associated with shipping Canadian wheat to Mexico. The absence of an EEP authorization for Mexico complicates matters for U.S. producers by allowing CWB pricing practices to go unchallenged in this increasingly important market, which is located literally in our back yard.

The GATT talks continue to suffer serious setbacks, to the extent that most producers have lost any faith they may have had in the process. Few have any hope that a beneficial agreement, that will materially improve their own economic situations, is possible. Most, in fact, express a strong conviction to "fair trade" terms, hoping that they are not somehow further disadvantaged in the process. Following the experiences of the FTA and NAFTA there is little reason for producers to believe the GATT outcome will be beneficial to their interests. The thought of attaining the so-called "level playing field," one of the obvious and primary goals of the negotiations, is at best a distant glimmer.

Nevertheless significant opportunities for expansion of export sales exist in a number of regions around the world. The privatization of the milling and food processing industries in a growing number of countries will allow U.S. wheat producers to expand their influence in these markets. Since the U.S. grain production, handling and transportation infrastructure is the envy of importing and exporting countries alike, U.S. producers should be able to tailor more wheat sales to individual customer needs.

With six classes of wheat to offer, no other country has the flexibility to specifically match sales of raw material to the individual needs of millers, bakers and processors around the world. This flexibility also requires a commitment toward informing potential customers of the attributes of U.S. wheat and assisting them in obtaining desired results.

U.S. spring wheats have achieved success in this area in recent years. Due in part to privatization or relaxation of government controls, spring wheat producers have penetrated a number of non-traditional markets by demonstrating the desirable characteristics of medium and lower protein spring wheats. Many of these markets, formerly hindered by their government buying agencies, had not been exposed to alternative wheats or information regarding specialized wheat/end product relationships. With technical assistance from U.S. Wheat Associates, Brazil, Egypt, China, the FSU and a growing number of African nations are increasing their usage of U.S. spring wheat instead of continuing with softer wheats from the EEC.

One of the negative aspects of the privatization process is the fact that our government export programs such as EEP actually perform better on a government to government basis. In other words EEP or even GSM credits can often be more easily administered to buying agencies such as the FSU's Exportkleb or China's Ceroils than with dozens of individual millers with potentially very different requirements. The positive aspects of the privatization process probably outweigh the negative aspects, but the challenge is one that cannot be ignored.

Expanded interest in U.S. durum wheat is also surfacing in a number of non-traditional markets. Brazil, Egypt, Taiwan, the Philippines, and Indonesia are all examples of markets where expansion of durum milling and production of pasta products is occurring. In many of these areas traditional noodles are made from other raw materials. The "pasta type" noodle is a new experience for them. If the popularity of pasta gains even a small percentage of the explosive growth currently being experienced in the United States and other pasta consuming countries, the opportunities for U.S. producers will grow accordingly.

Capitalizing on evolving market opportunities will require a continued commitment to market development efforts that are already in place -- funded by producer check-offs -- and matched by Foreign Agricultural Service funds. Expansion of the proven, effective programs administered by U.S. Wheat Associates and other cooperator groups into new and lucrative markets should pay sizeable dividends to producer investments.

In summary it is very evident that U.S. wheat producers face a tremendous number of challenges -- some are familiar-- others are quite new. Successful producers will be forced to become increasingly efficient and to implement future technologies to remain competitive at home and abroad. Many of today's challenges also represent opportunities, for expanded sales and potentially better incomes. It is also evident that producers will be increasingly aware of the national and international events that impact their competitiveness. Producers will be ever challenged by competitors and our own consumers to be the most efficient, conscientious producers in the business of producing quality foodstuffs. It will be very important for all of us that the U.S. producer gets a fair shake in this increasingly global atmosphere.

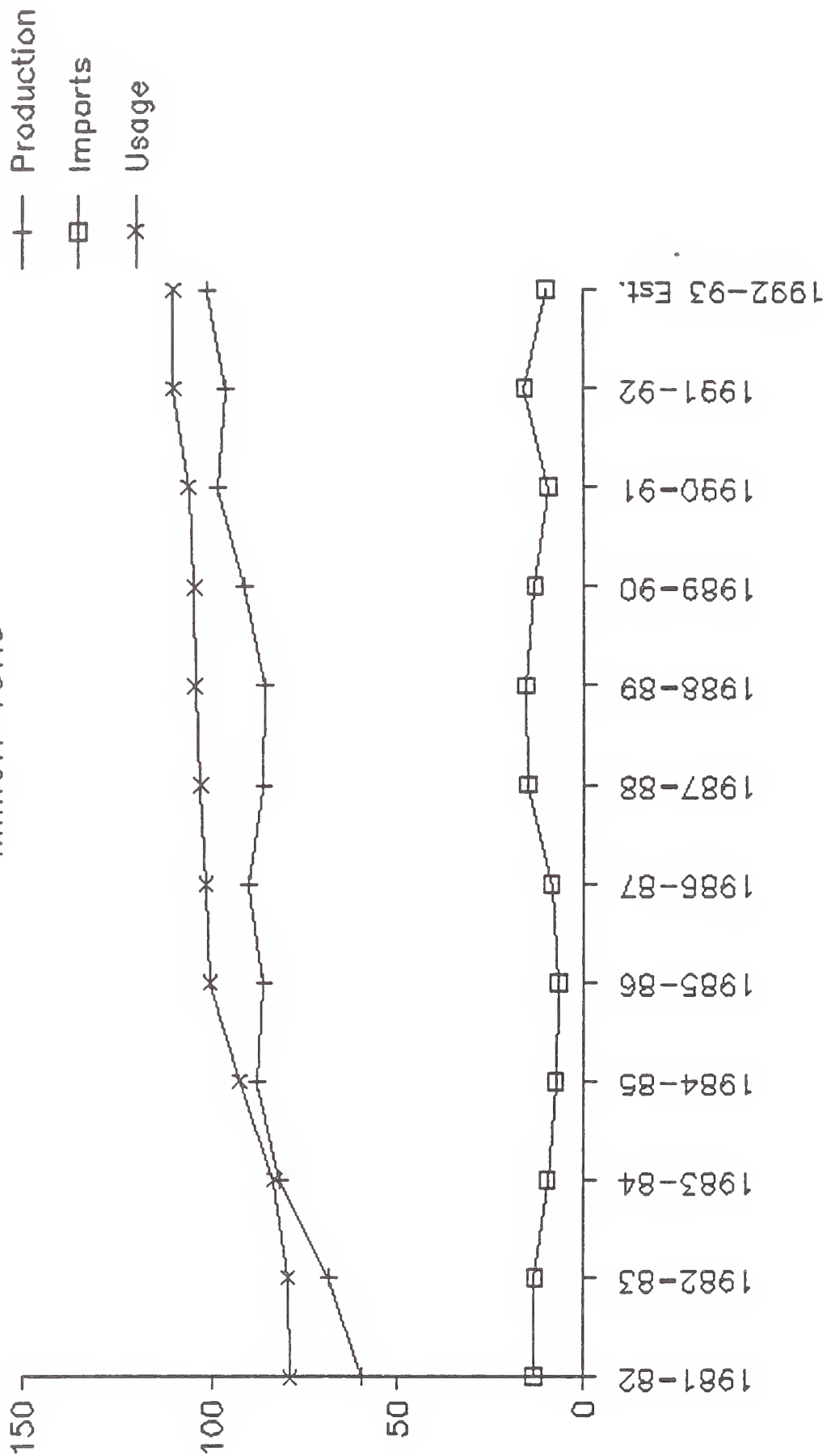
WHEAT EXPORTS TO CHINA AND THE USSR
(Million Bushels)

	CHINA		USSR	
	<u>US</u>	<u>All Sources</u> <u>US Share</u>	<u>US</u>	<u>All Sources</u> <u>US Share</u>
1981-82	312	485 64	254	745 34
1982-83	154	478 32	110	765 14
1983-84	110	353 31	162	753 22
1984-85	99	272 36	224	1032 22
1985-86	21	243 9	7	577 1
1986-87	2	312 1	29	588 5
1987-88	145	551 26	452	790 57
1988-89	305	570 54	190	570 33
1989-90	210	496 42	164	535 32
1990-91	140	370 38	100	440 23
1991-92	232	570 41	262	770 34
1992-93 Est.	200	590 34	200	515 38

NDWC 6/2/92
NF236

CHINA WHEAT SITUATION

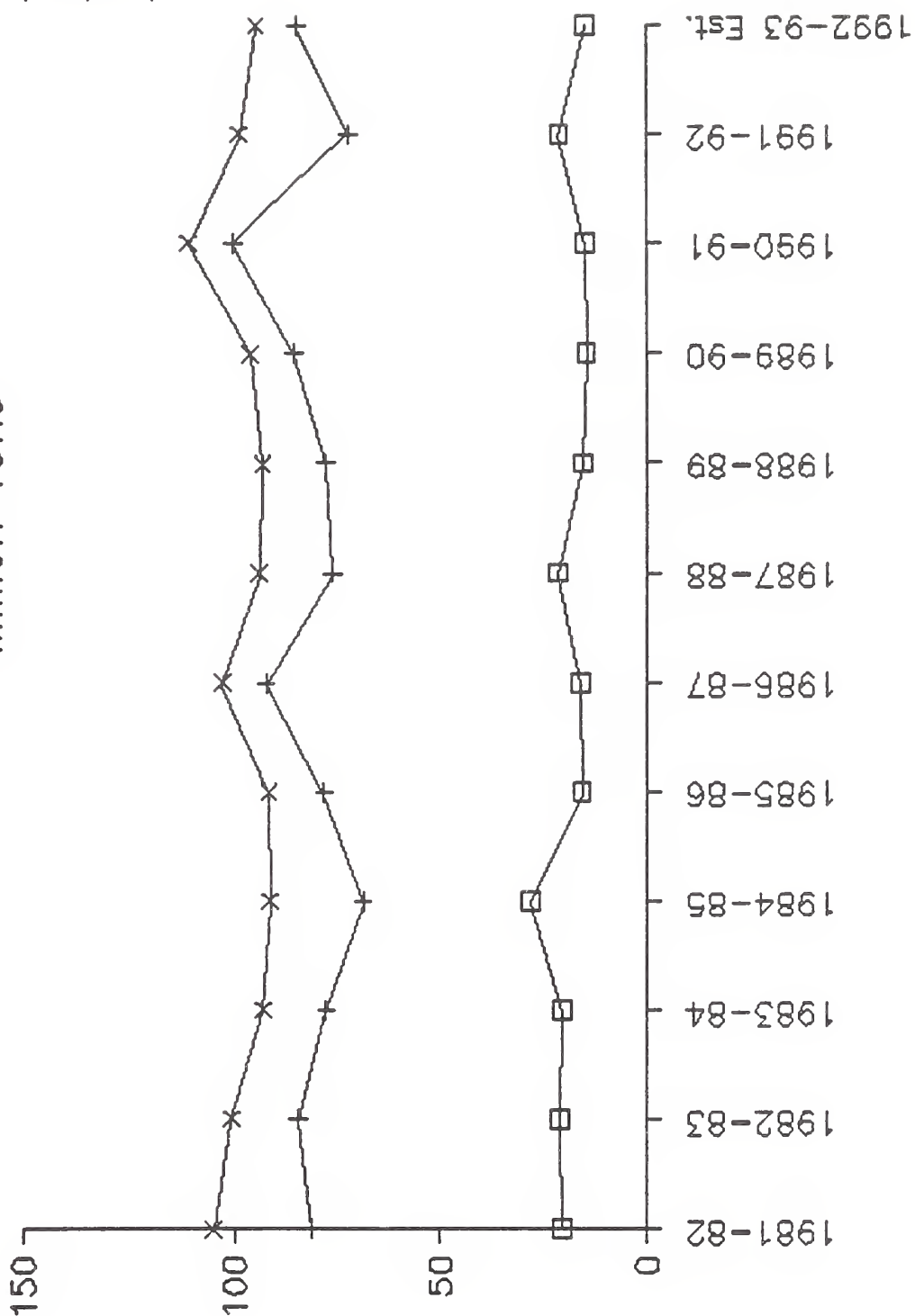
Million Tons



FSU/CIS WHEAT SITUATION

Million Tons

—+— Production
—□— Imports
—x— Usage



SHIPMENTS OF CANADIAN WHEAT TO THE UNITED STATES

Marketing Year (June-May)	ALL WHEAT		DURUM		SPRING	
	000 MT	Mil. Bu.	000 MT	Mil Bu.	000 MT	Mil.Bu.
1982-83	126.9	4.7	0	0.0	126.9	4.7
1983-84	62.5	2.3	2.6	0.1	59.9	2.2
1984-85	235.4	8.6	0	0.0	235.4	8.6
1985-86	317.5	11.7	0	0.0	317.5	11.7
1986-87	477.2	17.5	58.8	2.2	418.4	15.4
1987-88	298.8	11.0	163.8	6.0	135.0	5.0
1988-89	366.2	13.5	208.0	7.6	158.2	5.8
1989-90	303.7	11.2	165.3	6.1	138.4	5.1
1990-91	609.6	22.4	310.6	11.4	299.0	11.0
(June-May) 1991-92	839.0	30.8	375.2	13.8	463.8	17.0
(June-Aug) 1992-93	554.4	20.4	178.0	6.5	376.4	13.8

Source: Canadian Grain Commission

NDWC 11/2/92
NF229

TOTAL U.S. AND CANADIAN WHEAT EXPORTS TO MEXICO
(Million Bushels)

	<u>U.S.</u>	<u>Canada</u>
1980-81	43.9	1.0
1981-82	28.8	5.7
1982-83	2.5	6.9
1983-84	1.1	10.1
1984-85	0.2	----
1985-86	----	----
1986-87	3.1	9.5
1987-88	8.7	13.0
1988-89	39.0	----
1989-90	7.2	----
1990-91	12.8	2.3
1991-92	5.1	18.7
1992-93*	13.8	5.3

*(June-September, 1992-93)

NDWC 11/3/92
NF270

Outlook '93

For Release: Wednesday, December 2, 1992

OUTLOOK FOR DAIRY

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This was the year when summer never came, the economic recovery more or less came, and the Dairy Export Incentive Program (DEIP) came of age. These elements produced tight markets with rising prices during the first half of 1992, before a summer monsoon of milk reversed prices for the rest of the year. Barring phenomenal weather again in 1993, the coming year is expected to be relatively stable.

Commercial Use

Domestic demand has been unsteady in 1992, partially because of a wavering recovery in the general economy. Commercial use probably will rise about 2 percent on a milkfat basis and more than 3 percent on a skim milk solids basis. However, variation among months was pronounced and relatively independent of price levels.

Sales also varied substantially by product in 1992. Fluid milk sales have hovered around year-earlier levels and may slip fractionally for the year. Disappearance of butter probably will rise slightly because of stronger retail sales. Cottage cheese use might post a sharper-than-normal decline, but sales of ice cream and other frozen products were fairly strong in light of the chilly summer.

Gains in overall commercial disappearance have rested narrowly on brisk movement of cheese and nonfat dry milk. Commercial use of American cheese varieties may post their largest increase since the mid-eighties, with rise in sales of other varieties being smaller but substantial. Despite the relatively high prices of recent years, domestic commercial use of nonfat dry milk may reach a level not seen since the late seventies.

If the economic recovery solidifies in 1993, favorable retail prices should support growth in commercial use of many dairy products. The milkfat-basis total is projected to rise about 2 percent. However, commercial use of skim solids may be stagnant. Use of skim solids in processed foods may be hurt by the prospect of continued relatively high nonfat dry milk prices in the foreseeable future.

International Markets

Lower 1992 milk production in the European Community (EC), Scandinavia, and the drought-affected portions of East Europe helped tighten international dairy markets and generate somewhat higher prices. Price increases have been larger for nonfat dry milk than for butter, in part reflecting relative changes in U.S. export supplies. Along with expanded eligibility, tighter international markets led to increased DEIP activity with significant effects on domestic prices.

Thus far in 1992, DEIP contracts have been accepted covering the equivalent of more than 2 billion pounds of milk on a skim solids basis and somewhat less on a milkfat basis. The DEIP removed substantial quantities of nonfat dry milk, dry whole milk, and butteroil from domestic markets, mostly during months when many domestic prices were significantly above support levels.

Interest in DEIP contracts probably will remain high. U.S. suppliers recently have been willing to provide either nonfat dry milk or dry whole milk. Such flexibility tends to boost total quantities. However, the domestic surplus is not likely to be large enough to make major commitments. In addition, DEIP contracts often hinge on credit availability or other export programs.

Production

The effects of phenomenal summer weather dwarfed all other factors in determining 1992 milk production. However, 1993 output probably will be based on the slow underlying rate of expansion rather than on the transient levels generated by 1992 weather. In fact, the dark side of the summer weather may emerge during the first half of 1993, if supplies of decent forage start to run out.

The accelerated farm exit rate that reduced cow numbers throughout 1991 continued into early 1992. Winter cow numbers were more than 2 percent below a year earlier.¹ During spring and summer, relatively strong milk prices held cow numbers essentially steady, gradually narrowing the difference from a year earlier. In recent months, cow numbers have begun to slip again. The 1992 average probably will decrease slightly more than 1 percent from 1991.

Milk per cow grew quite modestly during the first 5 months of 1992, in line with relatively modest milk-feed prices ratios and small or no increases in concentrated feeding. Although feeding rates remained restrained, ideal summer weather in the Midwest and Northeast left milk per cow remarkably close to the seasonal peak and 5 percent or more above a year earlier. Although gains probably are easing this autumn, the 1992 total will rise more than 3 percent.

Supplies of good forage may be a problem for dairy farmers during the current feeding season. Although the silage crop was generally good, hay quality suffered considerably in the Midwest and Northeast. In addition, alfalfa yields were down sharply in the Lake States and western Corn Belt. However,

bumper production and slightly lower prices for grains and protein meals will help mitigate some of the forage effects.

In 1993, milk feed price ratios are expected to be only modest. Growth in milk per cow probably will be relatively slow during most of 1993 without additional incentive to boost feeding rates. Summer milk per cow probably will dip below a year earlier unless the weather is equally beneficent. For the year, milk per cow is projected to rise about 1 percent.

Cow numbers in 1993 will largely reflect the effects of milk prices on structural adjustment. Lower 1993 milk prices are expected to precipitate additional farm exits early in the year, but much of the potential adjustment may have already occurred during the 2 previous years. During 1989-92, milk prices were volatile but averaged relatively high. This price pattern and a probably sizable share of producers with considerable reserve debt capacity likely will lead to more producers making major expansions. On balance, milk cow numbers are projected to run fractionally below a year earlier throughout 1993.

Milk production in 1993 is projected at 151-152 billion pounds, near 1992. Shorn of the effects of weather, milk output appears to be on an expansion course of about 1 percent a year.

Stocks

Commercial stocks entered 1992 at fairly typical levels, but tight conditions trimmed normal spring increases in cheese and nonfat dry milk holdings. The summer milk production surge allowed stocks to catch up. Nonfat dry milk inventories (and to a lesser extent other-than-American cheese) were pushed to relatively high levels, but are expected to be brought down easily this autumn. By yearend, commercial stocks are expected to be about the same as a year earlier.

Declining Government stocks of butter still were a record for October 1. Yearend holdings will be very large but not necessarily above a year earlier. Stocks of cheese and nonfat dry milk have been insignificant.

Removals

Commodity Credit Corporation (CCC) purchases of butter were heavy during January-May. Significant purchases continued during most of summer, as cream supplies were boosted by extraordinary fat content of farm milk. Along with DEIP removals of butteroil, dry whole milk, and a little cheese, butter purchases will push the milk equivalent, milkfat basis, of 1992 CCC net removals close to 1991's 10.4 billion pounds.

On a skim solids basis, net removals have been small in 1992. Only a little nonfat dry milk and no surplus cheese was bought. Activity under the DEIP will bring net removals to about 2 billion pounds milk equivalent, about half the year-earlier total.

In 1993, milkfat removals are projected to decline, as commercial use grows while production is about the same. However, the surplus of skim solids is expected to be slightly larger if commercial use (skim solids basis) weakens.

Prices

Winter prices were seasonally weak after adjusting from the late 1991 peaks. Wholesale prices of nonfat dry milk and cheese started to rise in February-March following a flurry of DEIP activity. Expectations of tight late 1992 skim milk markets generated sharp spring price increases. The summer surge in milk production dramatically altered market expectations. Cheese prices have gradually eroded during summer and autumn, while powder prices decreased more sharply but then recovered slightly. Butter prices hugged support purchase prices through August, but posted modest seasonal increases in recent months.

Farm milk prices stayed well above a year earlier during the first 3 quarters of 1992. Initially they were adjusting from much higher prices at the end of the preceding year and later were reflecting the strong wholesale prices for cheese and nonfat dry milk. Although autumn prices are slipping below a year earlier, the 1992 average will rise about \$1 per cwt from 1991's \$12.24.

The larger skim solids surplus is expected to contribute to a 3-to 7-percent decrease in average 1993 milk prices. Winter prices will be weak and flush season prices may not be much above the support price. Moderate seasonal rises are projected for the second half. Key factors in the 1993 price outlook include the strength of commercial use of skim solids, the number of new or greatly expanded dairy operations, and DEIP activity.

Retail dairy prices will rise an average of less than 3 percent in 1992. A lower farm-retail price spread has helped to mitigate the effects of higher farm milk prices. Retail dairy prices in 1993 are projected to be about the same, as a wider price spread offsets farm price declines.

Summary

Next year is not expected to be a lot different than 1992: about the same milk production; slightly larger milkfat sales; slightly smaller skim solids sales; and somewhat lower average prices. However, skim solids markets are expected to be still fairly tight and modest changes in conditions could make substantial differences in prices.

Outlook '93

For Release: Wednesday, December 2, 1992

AN ALTERNATE VIEW ON THE DAIRY OUTLOOK

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For the dairy industry, 1992 has been a pleasant change from the conditions of 1991. Slower milk production growth, coupled with some increased demand, resulted in relatively strong milk prices in the first half of the year. Milk prices remained at or above year-earlier levels through October, although it appears that they will slip below 1991 levels in the last two months of 1992.

Before getting to the dairy outlook for 1993 and beyond, I want to highlight a few points dairy analysts seem to ignore or at least discount these days. The first point is that dairy producers adjust milk production in response to changes in milk prices and input costs. I think everyone recognizes this as common sense, but very few industry analysts appear to take it into account when evaluating the dairy situation or forecasting the dairy outlook. I suspect this stems from experiences in the late-1970s and most of the 1980s when production moved on almost irrespective of prices.

Data from this period also drive econometric models of the dairy industry, which indicate that supply response is very small when prices change. Models such as those used by USDA, CBO, and FAPRI were used to model the dairy industry for the 1990 Farm Bill. Model results indicated that the U.S. all-milk price would hover in the \$11.50 to \$12.25 range (equivalent to an annual average M-W of \$10.25 to \$11.00) for the life of the farm bill with milk production remaining more than adequate to meet demand.

The milk production response to the drop in milk prices in 1991 (annual average of \$12.26) should have caused most industry analysts to adjust their thinking. However, despite much stronger milk prices in the first half of 1992, I am amazed at how many people are surprised at the strength in milk production in the third quarter. Not only have milk producers made adjustments to changes in milk prices and net income, they have made them much more quickly than many analysts believed possible.

What are so many people missing when evaluating changes in milk prices, input prices and aggregate milk production? I believe the answer lies not at the macro level, but at the farm level. It is almost a cliché these days to say the dairy industry is undergoing structural change. Look closely at what this is doing to dairy farming. Those dairy farm managers who do not pay close attention to prices received for their outputs and prices paid for inputs are

leaving the industry. By attrition, the level of management on U.S. dairy farms has increased dramatically in recent years.

I often feel that dairy farm managers today know more about economic theory than many dairy economists. They understand that a manager's job is to adjust input use and output level when relative prices change. More than ever before, they anticipate changes in supply-demand conditions and respond to changes in prices as such changes occur, rather than waiting to see what the long-term trend is. It is these farm level actions that are showing up in our aggregate industry numbers. Structural changes at the farm level have had and will continue to have a major influence on milk prices and production in the coming years. It will take several years before there is enough data for our informal and formal models of industry to reflect these changes, so until then, let's go back to using some common sense when interpreting the situation and using our crystal balls.

One final point before I get off my soapbox. I believe that one reason that analysts have tended to discount the influence of prices on milk production is that other factors affecting production are also changing. I in no way wish to minimize the impacts of a drought (1988, and to a lesser extent, 1991), or a poor growing season (1989 and, to a lesser extent, 1992), or a cool summer conducive to milk production (1992). However, I have read many accounts of why milk production growth has spurted or lagged during the past few years, and milk price is rarely mentioned as a cause, let alone a major factor. I feel this does our industry a real disservice.

One reason my remarks to this point have focussed on milk production is that Jim Miller's comments provided a good discussion on the commercial disappearance side and I agree with his analysis. However, Jim and I disagree some on our forecasts of milk production and prices. Remember, even with the low milk prices of 1991, total milk production that year was above that for 1990. I doubt that a milk price in the mid-twelve dollar range like Jim has will cause a drop in aggregate milk production for the year. I do agree that milk production growth will slow in the second half of 1993 in response to lower first half milk prices.

My forecast is for milk production to grow about 2 percent in the first half of 1993, driven by a slower decline in cow numbers and continued increases, albeit smaller ones, in output per cow. I look for this growth to slow in the second half of 1993, with total milk production for the year up one to one-and-a-quarter percent. Such growth in milk production, coupled with sluggish commercial disappearance, will put a lot of downward pressure on milk prices. My outlook for price has the M-W (or its replacement) falling over \$2.00 from the 1992 peak of \$12.59 (at 3.5% BF), to around \$10.40 during March and April; still well above support, but I see the M-W averaging nearly \$1.00 lower in the first half of 1992 than for the same period in 1991.

For the second half of 1993, I see a different story. Sluggish milk production coupled with (I hope) more evidence of growth in the U.S. economy stimulating demand, will result in strengthening milk prices. I look for the M-W to peak by October at \$12.60, about the same peak as in 1992, with second

half milk prices averaging slightly above the same period in 1992. Under my scenario, the average annual all-milk price in 1993 will be nearly 50 cents lower than 1992.

Some of the keys to my forecasts include the fact that I do not believe that forage quality and quantity are as poor as some claim; below average for sure, but not poor. I do expect lower grain prices, especially for corn, to keep the milk:feed price ratio from falling too far. I also expect a change in the CCC butter purchase price (with a corresponding change in the nonfat dry milk price), which will stimulate increased export sales of butter and butteroil. I do not look for any major changes in dairy policy, with the exception that there is an outside chance that legislation will pass increasing the support price 50 cents. However, this would not go into effect in time to prevent the M-W falling below \$10.60, but may result in higher milk production than I forecast in the second half of 1993, and therefore an M-W peak below \$12.50. Finally, I am tired of hearing hints that bST will become commercially available "next year," so my standard comment has become "even if bST is approved next year, the effect of this technology on milk production and prices will be little if any in the first year of use."

Outlook '93

For Release: Wednesday, December 2, 1992

INTERNATIONAL MARKET DEVELOPMENTS AND INTERMEDIATE-TERM OUTLOOK

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Look back at the changes in the world during the last 5-10 years and the changes in international dairy markets and dairy policies around the world. How much of what has happened was predictable? EC dairy quotas were new and EC stocks were enormous, U.S. support prices and dairy program expenditures were at all-time highs, Gorbachev came to power in the Soviet Union and changed the world, the GATT Uruguay Round began, there was no DEIP program. It would be very surprising if the situation in 5-10 years would correspond well with what is foreseeable today.

On the other hand, there are some major forces at work that will be important to the development of international dairy markets. These include European reform and integration, trade agreements, and developments in the former Soviet bloc. In addition, the shift away from milkfat in the diets in upper-income countries has had important effects on dairy markets and will continue to do so in the coming years.

European reform and integration

The European Community remains the largest force in the international dairy market, holding 40-50 percent of the export market. EC exports, on a milk equivalent basis, are about as large as the combined milk production of New Zealand and Australia. The EC is also prone to occasional wide swings in its policy, as when it imposed milk quotas in 1984 and when it made an extraordinary appropriation of 1 billion ECU to liquidate stocks in 1987 and 1988. In May 1992, the EC agreed on the most far-reaching reform of the Common Agricultural Policy, known as the CAP, in 25 years. The course of EC dairy policy will be one of the keys to international market developments.

There were several reasons for the CAP reform. First, agricultural programs threatened to break the EC budget, a recurring nightmare during the EC's short history. Several commodity programs including cereals and beef offered production incentives far beyond the needs of the EC market at prices far above international prices. The EC needed to limit its budget exposure.

Second, the EC was nearing the promised deadline of the EC-1992 program to end all internal barriers to movement of goods, services, and people within the 12 EC members. The Maastricht treaty, if ratified, would bring eventual monetary

union and potential political union among EC countries. The EC, which still spends 58 percent of its funds on agricultural programs, needed to devote more of its money to other sectors of the economy.

Third, the EC needed to position its policies to accommodate another enlargement. Several members of EFTA - the European Free Trade Area - had either formally applied for EC membership (Austria, Sweden, and Finland) or were proceeding toward applying (Norway). Also, several countries of the former Soviet bloc - Poland, Hungary, and the Czech and Slovak Republics - were aggressively seeking closer ties to the EC with the goal of membership as soon as possible. The reforms limited the EC's financial exposure.

Fourth, while EC officials could explain the need for CAP reform at great length without mentioning how GATT influenced policy reform choices, the EC faced a number of trade disputes stemming from its need to subsidize agricultural exports.

Somewhat surprisingly, the CAP reform's dairy provisions were scaled back, while other sectors were fundamentally changed by replacing high price supports with income compensation. The CAP reform proposals for dairy included a net quota reduction of 3 percent and a 10-percent cut in the milk support price. The reform agreement required no quota reductions and only a 5-percent cut in the butter support price, which will effectively reduce the milk support price by a little more than 2 percent.

Why should the EC act in this way, and what does it portend for EC dairy policy in coming years? First, the dairy policy was already reformed, not according to U.S. standards, but by EC criteria. That is, the EC budget for dairy products, while large at \$7 billion per year compared to \$400 million for the United States, was stable and under control as a result of reforms carried out in the 1980s.

Second, the EC dairy market did not appear oversupplied at the moment. EC wholesale prices were relatively high. The EC had not bought any nonfat dry milk through its flush period, but rather had run down its stocks of nonfat dry milk by more than half from 400 thousand tons at the beginning of the year.

Third, the EC faced demands from 3 countries to have their milk quotas increased. In fact, the EC granted more quota to Spain and Greece, while promising the Italians a hearing on their request for more milk quota. The EC would have been hard pressed to explain quota increases for some of its members, while imposing quota reductions on the others.

Nevertheless, the CAP reform is important for the EC dairy program. The CAP reforms left the way open for 1-percent quota cuts each of the next 2 years on review of the market situation. The CAP reform also pointed in the direction that the EC Commission would move - both price and quota reductions - when

large surpluses return or when the budget requires further reductions in dairy support.

There are at least three reasons that EC dairy surpluses and budget troubles will return. First, the EC has recurring budget crises as reforms to individual commodity programs push agricultural resources into production of surpluses in other commodities. Second, the EC, while slowed by member states' resistance to the Maastricht Treaty, remains very ambitious institutionally. New EC functions and structural adjustment for new EC members will require either more funds or a redistribution of current EC spending.

Third, the dairy program, although restrained by milk quotas, contains a hidden surplus of about the same magnitude as the subsidized exports. The hidden surplus is absorbed by domestic consumption subsidies such as the subsidy for bakers' and confectioners' use of butter in food products and the subsidy for feeding skim solids to calves as liquid skim or by incorporation of dried skim powder into calf feed. The EC estimates butter consumption is falling by 1 percent per year, but that without subsidized domestic consumption, butter consumption would fall twice as fast. Subsidies for exports and for domestic consumption are expensive, but a milk quota program is not inherently costly to the government, as the EC has demonstrated by its sugar program. The way for the EC to reduce dairy expenditures while maintaining the quota system is to bring the total quota in line with domestic consumption.

To summarize the EC's situation, further curtailments of the dairy program are likely even without an agreement in the GATT Uruguay Round. Consequently, the EC would export less dairy products onto the international market, which would help to support international prices.

Trade agreements

GATT

What GATT agreement? If there is a GATT agreement to finish the Uruguay Round along the lines of the draft final act put forward by GATT Chairman Arthur Dunkel, the reform of world dairy trade would lead to an increase in world prices for dairy products of 10-15 percent over the 6-year transition period. The Dunkel text requires a reduction of 24 percent in tonnage terms and 36 percent in export subsidy spending over a 5-year transition period from the volume and spending levels on average during 1986 through 1988. The prime dairy effect of the export subsidy provisions would be a reduction of EC exports. The prime beneficiaries for dairy would be the low-cost producers, New Zealand and Australia. The higher international prices could also encourage other countries to invest in the modernization of their dairy sectors.

U.S. quotas on dairy product imports would be converted to tariffs. Because the tariffs would be relatively high, imports would occur only under the access provisions. By the end of the transition period, the access commitments would be the equivalent of 2.6 billion pounds (milk equivalent, fat basis). U.S. dairy policy would probably not have to be changed to meet internal support commitments. Support prices have been reduced since the base period, and other actions have resulted in additional credits for policy changes. The effects on U.S. milk prices, production, and government program costs would be small relative to baseline levels. Government purchases would increase moderately.

NAFTA

The U.S. dairy industry will benefit moderately from NAFTA because Mexico's population and income growth are projected to outpace its dairy production growth for many years. Mexican imports of U.S. milk powder are expected to grow by about 20,000 metric tons by the end of the transition period. That is \$36 million additional dairy export sales at current world prices. Other dairy product exports will also increase faster than without NAFTA. Dairy trade rules with respect to U.S.-Canada and Mexico-Canada are unchanged under NAFTA.

Mexican import licenses are the most significant trade barrier to U.S. dairy products. Mexican tariffs on dairy products are relatively small, ranging from zero up to 20 percent ad valorem on evaporated milk and cheeses. Mexican import licenses will be eliminated immediately. The United States will be guaranteed annual duty-free access for 40,000 metric tons of milk powder. Above that level, tariffs beginning at 139 percent ad valorem (\$1160 per metric ton) will be phased out at a rate of 4 percent per year for the first 6 years of the transition, then a straight-line reduction to a zero tariff at the end of the fifteenth year. For other products such as evaporated milk and cheeses, the 20 percent ad valorem tariffs will be phased out on a 10-year straight-line schedule. NAFTA does not address export programs.

Mexican dairy products are subject to U.S. Section 22 import quotas. The U.S. quota licensing system does not specify Mexico as the country of origin on any of the licenses that are issued currently. Mexico will gradually receive open access to the U.S. market over a 10-year period. Mexico will be granted improved access for its own dairy products into the U.S. market through a tariff-rate quota, which is composed of a small duty-free quantity and tariffs on over-quota quantities. For cheese, the United States will establish an aggregate initial Mexican duty-free quantity of 5,550 metric tons for all cheese varieties subject to Section 22 import quotas. The duty-free quantity will expand at a 3-percent compounded annual rate over the 10-year transition period.

For other dairy products, the United States will establish a number of basket quotas for groups of Mexican dairy products other than cheese that are

currently subject to Section 22 import quotas. The aggregate quota for dairy products other than cheese will be approximately 5 percent of the current U.S. quotas. The duty-free quantity will expand at a 3-percent compounded annual rate over the 10-year transition period. Initially, over-quota quantities will be assessed a tariff equal to the 1989-1991 average value of the tariff equivalent of current quotas. The tariffs will be eliminated over the 10-year transition period.

Strong provisions on reprocessing and product origin will ensure that the increasingly open border with Mexico does not result in Mexico becoming an export platform for non-NAFTA parties. Non-Mexican origin goods must be transformed or processed significantly in Mexico before they can receive NAFTA's lower duties for shipment to the United States. No non-NAFTA milk or milk products may be used to make milk, cream, cheese, yogurt, ice cream, or milk-based drinks, including chocolate milk. For infant preparations, dairy preparations, butter substitutes, and calf milk replacer feed, up to 10 percent by weight non-NAFTA milk solids components is permitted. Mixes and doughs may contain up to 25 percent non-NAFTA butterfat. For certain items made primarily from non-dairy products but also containing some dairy products, there is no restriction on origin of dairy content. All dairy inputs for these products may be non-NAFTA: chocolate crumb, mixtures of animal and vegetable fats and oils, and sugar confectionery not containing cocoa.

The United States exported \$121 million of dairy products to Mexico in 1991, about one-third of which was nonfat dry milk. The United States imported only about \$1.5 million of dairy products from Mexico. Mexico is the world's largest importer of milk powders. The United States shipped an annual average of more than 40,000 tons of U.S. nonfat dry milk between 1980 and 1990, about 20 percent of U.S. powder exports and 25 percent of Mexico's imports. U.S. commercial exports of dairy products to Mexico have been relatively small (34,000 metric tons in 1991), but exports have been growing in recent years -- especially of yogurt, ice cream, cheese, and fluid milk.

U.S. commercial exports of dairy products to Mexico are projected to increase moderately as border measures are dropped and Mexican incomes grow. Mexican imports of U.S. milk powder with U.S. government assistance through CCC direct sales and the Dairy Export Incentive Program are expected to grow to 55,000-65,000 metric tons by 2007, a 50-percent increase compared to projections without NAFTA. The gain from NAFTA amounts to \$27-45 million in nonfat dry milk sales at current world prices. The United States will continue to compete with other countries, chiefly the European Community and New Zealand, for milk powder sales to Mexico, with no change in access terms for any of the sellers pending the conclusion of the Uruguay Round. U.S. exports of dairy products to Mexico other than nonfat dry milk are expected to total \$200-220 million, approximately 15 percent larger than without NAFTA. Mexico is unlikely to become a major exporter of dairy products to the United States.

Any increase in imports from Mexico will be more than offset by additional exports to Mexico.

More trade agreements?

If the GATT Uruguay Round is completed, the incentive for bilateral and plurilateral trade agreements will be much smaller. With NAFTA, some estimates showed that a large share of the NAFTA benefits to U.S. agriculture trade with Mexico would have come about anyway under the GATT proposals that were being considered. Many countries have expressed interest in pursuing freer trade with the United States, including Chile and other South American countries, but they are not even at the talking stage yet, and the incoming administration has said nothing specific about more trade agreements.

Former Soviet bloc

The former Soviet bloc is of course a major source of uncertainty for international dairy markets as for every other market. Each country is different, so one can only generalize and give anecdotal evidence for individual countries. The unpredictability of developments in the nations of the former Soviet bloc does not, however, reduce our curiosity, so I will attempt some assessment. Fortunately, some of my colleagues who worked in Poland and the Czech and Slovak Republics as part of ERS' efforts to begin Situation and Outlook analysis programs in those countries brought back useful insights.

Until 1989, the centrally planned economies of Europe, in which I include the former Soviet Union, placed great emphasis on production. Purchased inputs were available at below-market prices. Prices of important foods including dairy products were kept low. Per capita consumption of dairy products was high relative to per capita disposable income. The Soviet Union became the world's largest butter importer. Some of the countries exported dairy products to the West to gain hard currency.

Since the Communist fall, production of milk has fallen in all of the formerly Communist European countries, with the most dramatic reductions in the countries in which the state sector controlled most of the milk production.

In the processing and distribution of dairy products in Poland, there has been a collapse of the processed fluid milk market in some countries. Small-scale entrepreneurs have sprung up to market products, for instance selling butter out of the car trunk or taking the milk can to town to sell directly to individual consumers. The processing and distribution sector is capital-starved, accumulating investment capital through high margins on sales. In the Czech and Slovak Republics, by contrast, fluid milk processing continues as before, and only the retail sector is characterized by wide margins.

Dairy products consumption has been buffeted by three main forces. First, the revolutions have led to macroeconomic collapse. Second, consumer incomes and employment have fallen due to the closing of state-run industrial plants. Third, relative prices have not been favorable. When the state no longer was willing or able to subsidize food consumption, real prices of many foods went up and rose relative to nonfood items. The brighter side for consumers has been a greater availability, a better quality, and a wider variety of food, even though at less affordable prices.

The countries of the former Soviet bloc have had a small presence in international dairy markets with one major exception. The former Soviet Union began importing massive amounts of butter consistently in 1979. From then through 1991, the former Soviet Union imported more than a third of all the butter traded. Altogether, the former Soviet bloc imported nearly 40 percent of the butter in international trade.

Among the other dairy products, the small presence that the former Soviet bloc has had consists of nonfat dry milk exports by Poland and Czechoslovakia, which had a combined share of 7 percent of world trade since 1986 and a smaller share before 1986. Poland has also been a small casein exporter, but there is some doubt whether Polish casein exports will continue.

The general outlook for these countries is for many years of adjustment. There is potential for production increases, and higher consumer incomes should pull demand higher. The rate of production growth is not expected to run ahead of consumption growth enough to greatly increase dairy product exports in the short run and probably not in the medium run.

The capacity of the republics of the former Soviet Union to import dairy products is largely dependent on food aid and credit guarantees. According to news reports, the Russians are having difficulty financing imports of a range of commodities, but have not defaulted. The New Zealanders, though, have reported slow payment on butter shipments to Russia. There is some possibility that the import financing difficulties in the countries of the former Soviet Union will worsen. In that case, it seems likely that the international butter market would weaken and that the terms of sale would worsen for those countries willing to continue exports to the former Soviet Union. Of course there is also some possibility that their ability to pay will remain steady or even improve in the medium-run. In either case, the general economic chaos in the countries that constituted the Soviet bloc has added an element of uncertainty to international markets that will remain for many years.

Relative fall of milkfat

An interesting development in dairy markets has been the relative decline of milkfat versus skim solids in the price support programs of several countries. The relative decline of milkfat is due to competition from vegetable fats and

dietary concern about total fat consumption. To get some idea of the shift away from butter and fat more generally, I took simple averages of per capita consumption of butter and margarine in a number of countries: United States, Canada, Germany, France, Netherlands, United Kingdom, Denmark, and Switzerland in 1988, 1989, and 1990. Per capita butter consumption fell one-sixth, and per capita consumption of butter and margarine together fell 10 percent. Butter's share of the combined consumption of butter and margarine fell from 43 percent to 40 percent.

I should remind you that the figures I gave are simple averages, not weighted by population. I should also tell you that the figures for the United States were the same in 1988 and 1990 for butter and margarine, the lowest of any country on my list. In some European countries, butter/margarine blends have only become legal within the last 5 years, so part of their shift is yet to come.

The shift away from milkfat has been reflected in the price support programs of both the United States and the European Community. The measure I am using is the shares of butter and nonfat dry milk in the value of milk at the support price. In 1982, butter's share in the United States was 47 percent versus 53 percent for nonfat dry milk. In 1988 butter's share was 50 percent, but following a series of changes over the last 4 years, butter's share of the value of milk at support has fallen to 30 percent.

In the European Community, world famous for its butter mountain, butter's share in the value of milk at their effective support price, called the intervention milk price equivalent, fell steadily from 56 percent in 1982 to 44 percent in 1992. With the scheduled 5-percent butter price decline I mentioned earlier, butter's share will fall further in the EC.

Using the same method - constructing a milk price from butter and nonfat dry milk prices - to compare the share of butter relative to nonfat dry milk in international dairy product prices, the share of butter in the value of this theoretical milk averaged 52 percent from 1979 through 1985, but only 35 percent from 1986 through 1992. International prices in 1992 indicate butter's share at 31 percent.

Summary

The outlook for international dairy markets in the medium run is, in some respects, murky. Reforms undertaken in Western Europe have been friendlier to dairy trade than a continuation of former policies would have been. The indicated policy direction in the European Community is toward further reform. Trade agreements hold out the promise of stronger worldwide economic growth, which will lift demand for dairy products and draw more dairy products into international markets. More trade agreements should be particularly encouraging for cheese trade, since cheese markets have been expanding. The chaos in the former Soviet bloc need not disrupt the butter trade market, but

it could if the states of the former Soviet Union are unable to secure financing for its import needs. A continuation of recent trends in butter and powder prices would be unfavorable to export earnings from butter trade.

Outlook '93

For Release: Wednesday, December 2, 1992

FARMERS AND NEW YORK CITY WORK TOGETHER TO DEVELOP
FARMER FRIENDLY STRATEGIES FOR PROTECTING THE
PRISTINE QUALITY OF NEW YORK CITY'S WATER

Albert F. Appleton
Commissioner
New York City
Department of Environmental Protection

In October of this year, New York City embarked on a bold new effort to manage and reduce the agricultural sources of water pollution in its 2000 square mile water supply watershed in partnership with the local agricultural community. At the same time, the New York began a year-long celebration of the 150th anniversary of its municipal water supply system, a remarkable engineering achievement that continues to supply its nine million customers with some of the world's purest and healthiest drinking water.

While the challenge of last 150 years has been the construction and maintenance of the water supply's dams, aqueducts and tunnels, the charge for the next century is to protect the pristine quality of the sources of the City's drinking water, some of which is located in watershed over one-hundred miles from the City. To that end, the City's Department of Environmental Protection, which I head, is currently engaged in finalizing and implementing an ambitious watershed protection and management program to protect those source waters.

As one of the major land uses in our watershed, agriculture, particularly dairy farming, presents one of the greatest challenges to our watershed management program. How did it come about, then, that the environmental resource protection interests of a large and distant city and the farm community's desire to maintain a fragile agricultural economy and way of life in the watershed region were reconciled? While our situation in New York may be unique, there are nevertheless constructive lessons here that the environmental and agricultural communities can learn so that the often inevitable conflict between them may be avoided. The results, in fact, can be quite fruitful. We've come so far together that City bureaucrats have begun pulling on their boots to tour dairy farms, or they're attending Farm Bureau meetings and dinners. In fact, Mayor Dinkins, who likes to say

that New York has everything, now speaks with pride about "our" farm program. Here's some background on where we started and how we got where we are today.

The New York City water supply system is the greatest surface storage and supply complex in the world, covering over 1,900 square miles, or 1,216,00 acres, of land area. In addition to its residents, the City supplies high quality drinking water to one million residents in upstate counties, as well as millions of daily commuters, tourists and visitors to the City.

In addition to managing and maintaining its water quality through an antidegradation program, the City is working to demonstrate to EPA and the New York State Health Department that it can provide above-standard drinking water without the need to filter water supplies from the Catskill and Delaware watersheds, which on the average day account for 90 percent of the City's water supply. Under the federal Safe Drinking Water Act and Surface Water Treatment Rule, communities like New York which rely on surface water sources may avoid filtration if they show that their source water meets federal and state raw water standards; that adequate disinfection is in place; and that an adequate watershed protection program to reduce the risk of waterborne disease can be implemented. The potential savings for the City is more than \$5 billion for construction of a filtration system to handle up to three billion gallons of water daily, plus annual operating costs estimated at \$200-400 million.

In September, 1990, the New York City Department of Environmental Protection issued a Discussion Draft of revisions to its watershed regulations. Under State public health law, the City has had authority since 1905 to issue and enforce regulations for the protection of its water supply sources in its upstate reservoirs. Those regulations had not been amended since 1953.

The Discussion Draft was developed to solicit input on approaches to meeting the City's overall objective: to prevent degradation of the sources of its water supply. Included in those draft regulations were a number of new restrictions for agricultural operations, including mandated manure storage and erosion and sediment controls, limiting distances to exclude activities near watercourses, and prohibitions on the discharge of contaminants from barn yards.

Many members of the farm community, including local, state and federal agricultural agencies and Cornell University faculty, believed that the Discussion Draft sections on agriculture threatened the continued viability of farms in the New York City watersheds, especially dairy and livestock farms. Even without the City's proposed regulations, agriculture in the watershed faced a tenuous future with enormous economic and land use

pressures causing increasing numbers of farmers to sell out to land speculators and developers.

At the same time, New York City believes, for reasons that I'll explain a bit later, that well-managed farms are a preferred land use in the watersheds for water quality purposes, compared to other forms of development, and their survival is essential to the long-term prosperity of the southeastern New York region.

Responding to the concerns of both the agricultural community and the City, the New York State Department of Agriculture and Markets convened an Ad Hoc Task Force on Agriculture and the New York City Watershed Regulations to address concerns about the Discussion Draft. The challenge for the Policy Group of the Ad Hoc Task Force was to recommend alternative regulations or programs that would protect New York City's water supply, while also sustaining the long term viability of agriculture within the watersheds.

The Task Force was advisory and had no legal standing. Its members collectively represented most of the entities with technical knowledge or legal and program authority to forge a workable program for agriculture in the watersheds. It included public health professionals, environmentalists, local, state and federal agricultural agency representatives, watershed county government, state and local farm organizations. Individual farmers, such as dairymen Dave Taylor and Bill Murphy, played central and active roles in the Task Force's deliberations. I was the chair.

From the outset, the Task Force had three goals:

1. To improve mutual understanding of the laws and public policies that shape the City's watershed protection program.
2. To improve mutual understanding of the characteristics of farm operations and of the technology and art of farm management that are available to address the influences of farm practices on drinking water quality.
3. To explore ways in which the city may work in partnership with farmers and the well established network of agricultural support institutions to encourage a sustainable farm economy in the watersheds, yet achieve the City's water quality objectives.

All participants in this process agree that these three goals were successfully achieved.

After an intensive year of regular meetings and subcommittee meetings, the community of diverse interests represented in the

Ad Hoc Task Force learned together that farming in the New York City water supply watersheds presents a complicated environmental management problem. As we all know, farm practices are a potentially significant source of nonpoint source pollution and present a risk of pathogen introduction into the water supply. Farm practice pollution control is critical for meeting the City's anti-degradation objectives, as well as the avoidance criteria of the federal and state Surface Water Treatment Rules. On the other hand, we learned that farming is a preferred land use, with significant long-term environmental benefits, and the City wanted to take all appropriate steps to support it. When well-managed, agriculture preserves the low density living-landscape of the watershed, and, unlike other landuses, a government support structure already exists to assist its management. Yet, as I mentioned above, supporting the continued vitality of farming in the watershed represents an especially significant challenge since agriculture is a rapidly declining industry in the region.

The City's regulatory approach to agriculture had taken a purely water quality perspective and set absolute technological standards for all farm practices, to be applied uniformly in all farm situations. Discussions in the Ad Hoc Task Force, however, have convinced City and farm community members that a locally developed and administered program of best management practices planning and implementation, tailored to the site specific and operational requirements of individual farms, with the voluntary participation of the farm operator, would be far more beneficial for both pollution control and the viability of the farm industry.

The City, after consulting with appropriate regulatory bodies and after full review of federal and state regulations, is satisfied that such a program would meet the avoidance criteria for effective watershed regulations and represents the best strategy for dealing with the concerns of both the City and the farm community.

Instead of taking a regulatory approach to agriculture, applied and enforced by the City, the City has entered into partnership with the watershed farm community to carry out a locally developed and administered Whole Farm Planning Program. The City has committed \$3.4 million over the next two years to refine and demonstrate this approach on ten pilot farms in five counties in the watershed, and use those ten farms to market the approach throughout the region. In the second phase of the program, Whole Farm Planning will expand to all willing farmers in the watershed. The watershed's agricultural and political leadership has itself committed to a goal of 85% participation in this program by 1997, at which time it will be evaluated and assessed.

These are the guiding principles for the watershed agricultural program:

1. The objective of the program is to protect the sources of the New York City water supply while keeping farms in operation. Agriculture should be continued and promoted as a preferred land use in the City's watersheds. Except for a general prohibition to safeguard against individual farm operators who exhibit a willful and irresponsible intent to pollute in a manner that threatens to significantly increase pollution levels and degrades the source waters of the City's water supply, the program will be entirely voluntary.
2. While entirely voluntary, farmer participation in the program will be strongly driven by incentives, including 100% "cost-sharing" for BMP planning and implementation, to be provided by the City and supplemented by state, federal and local funding sources, if available.
3. The preferred approach to source protection for farms is the use of Best Management Practices developed to meet water pollution control policies under the 1989 New York State Nonpoint Source Water Pollution Control Act and Section 319 of the Federal Clean Water Act amendments of 1987. In addition, Cornell University faculty will assist in the development of new BMPs, based on on-farm research and experience gained through the program.
4. The mechanism of choice for selecting agricultural BMPs is preparation of a Whole Farm Plan for each farm. A collateral objective for each Whole Farm Plan is to sustain and improve the economic viability of the farm.

Whole Farm Plans should be prepared by local County Project Teams, including professional staff from the county Soil and Water Conservation District, Cooperative Extension, and the Soil Conservation Service.

Whole Farm Plans should address these agricultural contaminants: nutrients, pathogens, sediments, toxicants, and organic matter. The level of control required for each Whole Farm Plan should depend on the location of hydrologically sensitive areas on the farm and in the watershed generally.

In managing agricultural contaminants, Whole Farm Plans should involve these components: soil erosion control, animal waste management, plant nutrient management, domestic animal pathogen management and chemical and pesticide management.

5. Continuing education, professional training and local involvement are essential component of the Whole Farm Planning approach to agriculture.

While many of these mechanisms and approaches for farm management are not new, our attempt to combine them into a whole package for each individual farm represents an innovation and challenge. Agencies that did not work well together in the past, such as Soil and Water Conservation Districts and Cooperative Extensions, will now sit down together with farmers to develop and implement farm plans for protecting water quality and the economic health of the farm.

In addition to new institutional relationships at the agency level, a new regional institution to address agricultural and environmental resource protection issues has also been established. The Watershed Agricultural Council, consisting of farmers and government agencies, will continue the consensus-building efforts of the Ad Hoc Task Force, as well as monitor the progress of the Watershed Agricultural Program.

And finally, the City has begun sitting down with farmers to explore opportunities and techniques for farmland retention to continue farming in the watershed region. Any program for farmland retention, from purchase or lease of development rights to real property tax reform and support for dairy price stabilization, must have the mutual support of the City and the farm community in order to succeed in New York.

**DRAFT AGRICULTURAL
POLLUTION PREVENTION INITIATIVE**
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I. INTRODUCTION

This paper describes a new cooperative initiative of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA) to adopt and apply a pollution prevention approach to American agriculture. The challenge is to continue to produce a safe and abundant food supply while assuring the economic viability of the agricultural sector, protecting public health, and preserving the integrity of the environment. The goal is to keep America's agricultural sector on a healthy footing - environmentally sound and financially viable.

Agriculture is one of the more extensive land management activities that affects the environment. Numerous environmental issues -- ground-water contamination, water quality and quantity, soil erosion and loss of productivity, human health effects from exposure to pesticides, losses in biodiversity and habitats -- have strong associations with agriculture. Focusing on agriculture and pollution prevention offers policy makers, government agencies, industry, and producers an opportunity to address a number of difficult problems simultaneously through cooperative efforts.

The challenges involved in agricultural pollution prevention are complex. No single approach can possibly be appropriate to identify and solve potential pollution problems for the appropriate portion of the Nation's two million farms, much less for forestry and other types of agricultural establishments. Agricultural production and associated inputs change rapidly due to changes in markets, climate, economics, and technology.

This initiative will develop a set of pollution prevention strategies for addressing the potential pollution issues associated with agriculture.

Many of these goals and targets will be determined and implemented through discussions and cooperation between the

for flexibility and individual initiative, new approaches and local innovations. This effort is envisioned as a significant first step towards a national strategy on agriculture and the environment.

A. Goals and Approach

The goal of this joint USDA/EPA agricultural pollution prevention strategy is to assure the economic viability of food and fiber production and to protect human health and aquatic and terrestrial ecosystems.

The public wants our agricultural systems to provide adequate food, fiber, and forest production; safe, diverse, and affordable food supplies and healthy aquatic and terrestrial systems.

The pollution prevention initiative is based on the following approach:

- Priorities are set and pollution prevention activities are targeted based on knowledge of risk to human health and natural ecosystems.
- Available tools are employed to efficiently reduce risk through voluntary action. Tools include market incentives, public/private partnerships, information and labeling, and educational activities.
- Partnerships are encouraged as a particularly important framework for undertaking initiatives. Partnerships can encompass interested parties at all levels of involvement, in both the private and public sectors.
- New approaches to reduce risk need to be stimulated and implemented, including less risky substitutes and more environmentally and economically efficient use of chemicals.
- Progress is evaluated by quantitative and qualitative measures of environmental and economic results.

B. Legislative and Policy Background

In September 1990, EPA's Science Advisory Board (SAB) recommended the "EPA should emphasize pollution prevention as the preferred option for reducing risk." Of the eight highest-risk environmental problems identified by the SAB in that report, four have some association with agriculture (worker exposure to chemicals in agriculture, drinking water pollution, loss of

habitats, and species extinction/loss of biodiversity).

At USDA, interest in a preventive approach to agricultural pollution has evolved out of the President's Initiative for Water Quality and in response to State nonpoint source assessment reports prepared pursuant to Section 319 of the Clean Water Act that identify agriculture as a principal source of nonpoint source pollution.

In 1990, Congress affirmed its commitment to a new approach to environmental pollution by passing the Pollution Prevention Act of 1990. The act establishes as national policy a hierarchy of environmental protection which states that:

- Pollution should be prevented or reduced at the source wherever feasible;
- Pollution that cannot be prevented should be recycled in an environmentally safe manner;
- Pollution that cannot be prevented or recycled should be treated in an environmentally safe manner; and
- Disposal or other release into the environment should be used "only as a last resort."

EPA has defined pollution prevention in the following manner:

Pollution prevention means source reduction, as defined under the Pollution Prevention Act, and other practices that reduce or eliminate the creation of pollutants through:

- Increased efficiency in the use of raw materials, energy, water or other resources, or
- protection of natural resources by conservation.

In the agricultural sector, pollution prevention approaches would include:

- Improving the management of water and chemical inputs;
- adoption of less environmentally harmful pesticides or cultivation of crop strains with natural resistance to pests; and
- protection of sensitive ecological areas.

C. Organizational Involvements

EPA and USDA have worked closely to define goals, develop

objectives, and determine the most feasible approach to achieve success. The working relationship and increasing convergence of the goals of these two Federal departments is an important aspect of this strategy.

USDA and EPA have formed an interagency Agricultural Pollution Prevention Task Force to develop a draft Agricultural Pollution Plan. The Task Force will consult with a broad spectrum of interested parties and involve agricultural and environmental groups in the process. The plan will contain a detailed statement of objectives incorporating environmental goals: programmatic approaches; institutional roles; financial, human, and technological resources; geographic targets; and a schedule for achieving objectives in a timely manner.

II. AGRICULTURE AND POLLUTION PREVENTION

A. Agriculture and the Environment

Agricultural pollution is often categorized as a type of "nonpoint source pollution" because it cannot be traced to a single source such as an industrial discharge pipe. Nevertheless, a variety of environmental effects on human health and the environment can result for agricultural activity:

- **Water Quality and Quantity** - surface water and ground water may be contaminated by pesticides, fertilizers, sediment, and animal waste; water quantity and quality may be affected by irrigation which can reduce instream flows and deplete aquifers.
- **Global Climate Change** - clearing of land releases stored carbon as carbon dioxide, livestock contribute methane; these greenhouse gases are implicated in global warming.
- **Soil** - soil erosion reduces soil productive capacity and leads to sedimentation in streams, lakes, and estuaries; irrigation can affect soil salinity and the health of wetlands that receive irrigation return flows.
- **Human Health** - exposure to agricultural chemicals can occur through occupational contact with chemicals by agricultural workers or through pesticide drift. Dietary exposures can occur as a result of residues of pesticides in foods and the presence of pesticides and nitrates in drinking water.
- **Biodiversity and Habitat** - pesticides may kill non-target birds and other non-target organisms such as beneficial insects, sediment can cover aquatic organisms and

spawning areas; conversions to cropland and grazing operations may cause losses in terrestrial and aquatic habitats such as wetlands and riparian areas, and may directly or indirectly lead to reductions in species diversity and abundance.

A variety of approaches have been used by producers in recent years to bring agriculture into greater harmony with the environment. Although there is no single blueprint, a hallmark of these approaches is that they typically treat the farm as a single, balanced system. The goal in a balanced farming system is total resource management - specifically to apply appropriate chemicals and nutrients at the proper time, amount, and location, conserve water and soil, enhance soil productivity, and ensure that farms can continue to produce adequate food supplies while providing farmers with a reasonable profit. The agricultural pollution prevention initiative builds on these concepts and experiences.

III POLLUTION PREVENTION STRATEGIES

EPA and USDA have identified four strategies to achieve substantial, measurable pollution prevention in the agricultural sector.

Strategy #1:

EPA and USDA will work together with other government institutions and the private sector to implement a nationwide program to minimize agriculturally-related pollution and environmental risks.

A. Achieve nationwide voluntary improvements in nutrient application, pesticide use, animal waste management, and cropland management that will reduce the negative impacts of agricultural activities on the environment.

- Work with agricultural leaders to launch a highly visible Voluntary Action Project to meet specific environmental goals through the development, transfer, and application of appropriate superior technology.

B. Improve the management of more hazardous pesticides to protect water, foodstuffs, soil, human health, and ecosystems.

- Expedite registration of low risk pesticides and those that pose lower risks than currently-registered pesticides.
- Provide better information (e.g., hazards, exposures,

lowest effective use rate/frequency) to farmers and affected public and promote industry/government partnerships to develop information programs.

- Identify and institute incentives for wider consumer choice regarding pesticides and food (pesticide laboratory accreditation organic certification).
- Encourage development and use of effective and efficient alternative pest controls (biological, cultural practices, mechanical pest controls, low-risk pesticides).

C. Promote ecologically and economically sound livestock and poultry waste management to protect surface and ground water.

- Establish livestock and poultry compacts for watershed areas.
- Support nutrient management plan implementation in priority watersheds.

D. Promote protection and enhancement of ecologically sensitive agricultural areas and stream systems through cooperative efforts with resource agencies and private landowners and through research and protection programs.

- Target the most critical ecological resources and endangered species through coordinated multi-media action by Federal, State, and private organizations.
- Promote protection and enhancement of conservation corridors, wetlands, and riparian areas in priority watersheds.
- Pursue geographic priorities for water quality action.
 - Identify priority watersheds/recharge areas for surface and ground water protection, based on the requirements of Section 319 of the Clean Water Act and on environmental risk.
 - Assist local leadership in setting criteria and establishing agreements to improve environment.
 - Rely on education and technical assistance, where it proves effective.
 - Monitor water quality improvement against agreed-upon targets.

Promote public/private partnerships to protect instream flows.

Strategy #2:

EPA and USDA will work together to develop a comprehensive pollution prevention marketing strategy that will seek to achieve voluntary participation by addressing the needs and attitudes of producers and other interested parties within the agricultural community.

A. Identify clienteles and clientele needs.

- Collect social and economic data for target areas and/or resources.
- Conduct marketing studies for identified clienteles.
- Develop targeted marketing strategies.

B. Develop programs to meet clientele needs.

C. Develop the marketing program.

D. Work with farm and ranch organizations to implement a marketing program.

Strategy #3:

EPA and USDA will work together to develop a coordinated research, technology development, and technology transfer system that supports production practices that protect and enhance the environment.

A. Sponsor research to develop superior technology to solve known pollution problems.

- Increase support for research on systems which reduce the use and movement of agricultural chemicals and support sustainable agriculture.
- Increase support for research on the health and ecological effects of agricultural activities.
- Speed development of reduced risk substitutes for today's most risky pesticides.
- Develop improved technologies for the environmentally protective application of pesticides and nutrients.

B. Transfer research findings.

- Develop improved methods for transfer of technology to achieve behavioral and environmental improvements.
- Investigate the effectiveness of alternative methods to market new and environmentally sound agricultural practices.

Strategy #4:

EPA and USDA will strengthen their working relationships to provide a unified force for positive change in the area of agricultural pollution prevention.

A. Develop and finalize a USDA/EPA memorandum of agreement on agricultural pollution prevention activities.

B. Identify and implement joint legislative authorities related to pollution prevention in the Clean Water Act, the 1985 and 1990 Farm Bills and future legislation.

C. Identify opportunities for additional sources of funding that can be targeted to pollution prevention.

IV MEASURING PROGRESS

An important focus of the Task Force's attention will be developing appropriate measures for assessing progress in implementing this strategy. For each of the four agricultural pollution prevention strategies, quantifiable measures will be developed and monitored, with an emphasis, wherever possible, on assessing progress in terms of environmental and economic results. Examples of measures of progress may include the following:

- Increases in numbers of certified farm consultants
- Number of states adopting improved fertilizer recommendations
- Acreage of cropland under total resource management
- Acreage of cropland under integrated pest management and following nutrient recommendations for nitrogen and phosphorus
- Availability and use of lower risk pesticides

- Acreage of riparian lands enrolled in the CRP
- Acreage of restored wetlands, riparian stream corridors on public grazing lands, and other environmentally sensitive areas
- Development of goals for changes in use and application of agricultural chemicals

V. CONCLUSION

For generations, American agriculture has been the pride of this country and a source of our prosperity. Helping agriculture produce in harmony with the environment offers the opportunity for multiple gains on all sides -- for the agriculture industry, for consumers, and for communities as a whole. At the same time, a vigorous pollution prevention effort in the agricultural sector will complement pollution prevention efforts going on in other sectors -- industry, energy, and transportation, the Federal government, and the consumer sector.

Outlook '93

For Release: Wednesday, December 2, 1992

FARM LABOR AND IMMIGRATION POLICY

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It would be useful, I believe, to begin a discussion on Farm Labor and Immigration Policy in the 1990s with a historic perspective. Of course, what we are talking about is the importation of foreign labor. Circumstances have changed over time, but the basic issues are not new. There are themes which have been repeated and refined in the debate which has been going on for a good part of this century. I then want to talk about some of the things I have observed as a member of two bodies which have studied the effects of the latest convergence of immigration and farm labor policy in the 1986 Immigration Reform and Control Act (IRCA). The report of Governor Wilson's Coordinating Council on Farm Labor has just been released and is available through the California Health and Welfare Agency. The Federal Commission on Agricultural Workers has completed its deliberations and will report its findings and recommendations to Congress next February.

As I said, the question of foreign agricultural workers is not new. The United States had its origins as an immigrant land and did not begin to restrict migration until 1875. Europeans came to provide supplemental labor on larger farms as indentured servants, Africans were imported as slaves, and many Chinese workers brought in for railroad construction and mining became agricultural laborers. Mexicans freely crossed the southern border.

President Theodore Roosevelt's Commission on Country Life in 1909 noted a tendency to rely on foreign labor in agriculture; the foreigner, it said, "being more efficient and reliable than the American" who was "less pressed by necessity." For all the changes in the country and in agriculture since Roosevelt's day, seasonal farm work remains one of the least desirable and rewarding options for an American worker. This is not to say that the circumstances of farm employment have remained the same during this time. As Americans moved from the country to the cities, and as farms grew larger, peak demands for labor in the more sparsely populated rural areas increased the need for a migratory labor force. More recently, labor saving mechanization has tended to reduce the need somewhat, but our agriculture still relies on hundreds of thousands of seasonal workers, many of them migrants. And because much of this work is still arduous,

low paying, hard on family life and out of the main stream of the relatively comfortable American existence, it is still performed to a great extent by foreigners.

Foreign workers have been most welcome during wartime when the need for field labor increased with the demand for production to meet the war effort and the supply of workers was reduced by the draft and the lure of better paying jobs in the defense industry. Labor restriction provisions of the new 1917 Immigration Law were immediately waived to sanction the admission of Mexicans during World War I. There had been a relatively free flow of labor across the southern land border in response to push and pull factors and this flow northward, legal and illegal, continued in the 1920s. It reversed during the depression years, but then during World War II, the United States again sought farmworkers from abroad. Labor was brought in under contract pursuant to intergovernmental agreements with Mexico, Jamaica, Canada, the Bahamas and other countries.

In 1952, a major revision of the Immigration Laws included for the first time the regular authority to admit foreign workers temporarily for seasonal or temporary jobs under what became known as the H-2 program.

As a condition of admission, the Immigration Service required a petition by an employer with a certification by the Labor Department, and the Labor Department incorporated, as conditions of certification, many of the standards which had evolved out of the wartime agreements.

The basic criteria for certification was that the importation of foreign workers not displace workers in the United States or adversely affect their wages and working conditions. To meet these criteria, an employer had to recruit in the United States for about 80 days before the work was to begin. A contract had to be offered with special wage rates set by the Labor Department. Housing had to be provided without cost and meals at a minimal cost. Work had to be guaranteed for three-fourths of the contract period, compensation for employment injuries assured and, in general, the terms and conditions of employment could not be less than local prevailing practice. If U.S. workers could not be found in response to this offer, foreign workers could be admitted to work for the petitioning employer under the same contract provisions. In addition, any qualified U.S. worker who applied during the first half of the contract period had to be hired. Many growers who had employed workers from the Caribbean under the wartime agreements continued to bring in West Indians under the new "H-2" program. Braceros from Mexico continued to provide legal labor until 1965 when efforts to extend the program failed in the face of labor opposition in 1964.

Although large numbers of Mexican contract workers were admitted under the Bracero program, illegal migration continued and often exceeded the legal flow. A program to legalize the illegal border crossers in the United States by putting them under Bracero contracts was instituted but dropped under heavy criticism that was a precursor to the debates over legalization prior to IRCA.

The 1952 law, under what was known as the Texas proviso, had exempted an employer from the criminal charge of harboring an illegal alien. That employment could be freely offered an illegal alien without penalty was seen as an inducement to illegal entry, but attempts to eliminate the Texas proviso failed in the early 1970s. However, concern over illegal immigration and particularly its impact on domestic labor mounted during this decade. The slogan "we must regain control of our borders" was compelling. In 1981, the Select Commission on Immigration and Refugee Policy had recommended a three-pronged approach to the problem.

The Select Commission recommended tougher border enforcement and sanctions against the hiring of undocumented workers to discourage illegal entry in the hope of employment. To avoid economic dislocations and the hardship sanctions would cause longterm, illegal residents, it recommended they be granted resident status. The Select Commission considered the situation of agricultural producers, many of whom were dependent on an illegal workforce they would be at risk to hire under employer sanctions. It decided not to recommend a new program for the importation of agricultural labor and suggested instead the streamlining of the H2 program to make it more useable. Thus, streamlining of the H-2 program became a part of the immigration reform packages considered by three successive Congresses in the early 1980s.

Labor advocates have long challenged the very premise of the H-2 program; A foreign worker, they say, who must depart the country if he loses his job, is easily exploited. Because a Jamaican can earn as much picking apples for 6 weeks in Virginia as he can make the rest of the year at home, he is more highly motivated to please his employer than a U.S. worker with other options. Also, certified employers may discriminate in their selection of foreign workers in ways they cannot when hiring in the United States. As a result, almost all H-2A workers are males of prime working age. Labor advocates say that these structural elements of the program are so appealing to growers that they do not make good faith efforts to find U.S. Workers; and that the labor Department lacks the resources to insure compliance. H-2A employers erect barrack style housing, suitable for an all male workforce. This discourages American migrant families from applying and single men because of cultural differences are not easily integrated into the foreign crews.

If the program is so appealing to employers, why hasn't it grown beyond the 20-30,000 certified job level where it has been for the last three decades? Most growers do not have housing which meets DOL health and safety standards; a critical threshold criteria. Growers who have housing and do apply invite scrutiny into the details of their employment practices, not only by the Labor Department, but by Migrant Legal Service attorneys. Industry representatives say that harassment by legal services adds significantly to the cost of the program in attorney fees and time taken away from productive activities. Farmers don't like the artificial regulatory structure imposed on the way they do business. Of course the overriding reason that more farmers had not used the H-2 program is that they have not had to. For decades, the domestic farm labor force had been supplemented on a large scale by illegal foreign labor.

Western agricultural interests in particular were skeptical about the potential of any H-2 program to meet the needs of perishable crop producers. The requirements for advance recruitment and contracting of U.S. workers were, they said, not practical because the timing and size of the labor force for many perishable crops could not be known until shortly before the date of need.

As they struggled to fashion passable immigration return bills, lawmakers found that it was not possible to gain consensus for a major "streamlining" of the H-2 program and, in the end, IRCA essentially codified the Labor Department regulations with relatively modest changes.

Meanwhile western growers had been promoting a guestworker program sponsored in the House in 1984 by Leon Panetta (D-Cal) and Sid Morrison (R-Wash) and in the Senate in 1985 by Pete Wilson (R-Cal). Under each of these proposals foreign workers would be admitted temporarily to seek fieldwork in perishable crops within designated regions. Although workers would not be tied to specific employers and worker protections were included, labor advocates were adamantly opposed. Potentially large numbers of temporary foreign workers would be admitted and restricted in the location, duration and type of employment they could pursue. Such conditions, they argued, would preclude any improvements in wages and working conditions and would lead to displacement of domestic workers.

There was a standoff on the issue of agricultural workers that threatened passage of IRCA itself. In the fall of 1985, Charles Schumer (D-NY) began working with Leon Panetta and Howard Berman (D-Cal) on a compromise solution which resulted in the Special Agricultural Worker (SAW) provisions. Growers wanted an adequate supply of legal workers with a minimum of red tape. Worker advocates would not accept any restrictions that tied workers to a particular employer,

region or industry. Common ground was found in the notion of a free labor market gained through granting full resident status to undocumented workers upon whom growers had come to rely.

From the labor point of view, the domestic work force should not be supplemented at all by foreign labor. However, these potential SAWs were already in the labor force and because of their undocumented status were easily abused. This situation would likely continue should IRCA fail. Labor hoped that, with control of illegal immigration and the rights that legal status would give formerly undocumented workers, the agricultural labor market would stabilize with upward pressure on wages and working conditions.

From the industry point of view, growers would have access to an experienced, legal labor force. Many employers were pleased with the idea of retaining undocumented employees in legal status of great concern, however, was the possibility that enough SAWs might seek employment outside of agriculture to create labor shortages. Thus, a replenishment agricultural worker (RAW) program became part of the package.

Under the SAW/RAW compromise, undocumented farmworkers who could prove 90 days of past work in perishable commodities would be granted full legal resident status. SAWs were not required to remain in agriculture as a condition of their status. If they left in numbers sufficient to cause a labor shortage according the Departments of Agriculture and Labor, the shortfall could be made up with RAWs. RAWs also would be legal residents, but this status would be conditioned by their performing field labor in perishable crops at least 90 days in each of their first three years. The RAW program was to end after four years in September 1993.

The IRCA debate had been particularly emotional with respect to amnesty. Many believed it wrong to grant resident status to aliens who had entered illegally when others, already determined eligible for residence, had been waiting for years and would continue to wait abroad for visas. Questions of fairness toward other groups seeking admission such as political refugees, and the question of how long a period of continuous residence must be to warrant amnesty were raised. Many members expressed their resentment when they were told that a much easier route to resident status for farmworkers was part of a compromise they must accept as the only way to achieve immigration reform.

Of course IRCA did pass and over one million undocumented farmworkers gained legal status as SAWs. There have been no RAWs. The Departments of Agriculture and Labor have estimated that there would be no shortage for each of the four years of the program.

As a member of the California State Council on Farm Labor and the Federal Commission on Agricultural Workers during the past 3 years, I have had the opportunity to study research reports and papers by experts on farm labor matters. Each of my fellow panelists has made a significant contribution to the store of information that has been gathered. I have also heard testimony from farmers, farmworkers and others at hearings throughout California and across the country. I would like to summarize now what I have learned about the agricultural labor market in the aftermath of IRCA and then offer a perspective on the question of farm labor and immigration policy.

It was to be expected that with control of the border and effective employer sanctions under IRCA, there would have developed a tighter agricultural labor market. Economic theory tells us that as labor becomes scarce, there is upward pressure on wages and other conditions of employment tend to improve. With few exceptions this has not happened. There seems to be almost universal agreement that there has been a more than sufficient labor for perishable crops in the post IRCA years.

It is not possible to account for the size of the labor force with any specificity. A substantial part undoubtedly consists of unauthorized workers. It is apparent that large number of aliens are still crossing the southern border illegally and that many are finding jobs in agriculture. This is in spite of employer efforts to comply with the documentary requirements to determine whether a new hire is authorized to work. Fraudulent documents abound and too close scrutiny could expose an employer to charges of discrimination. It also appears that a large portion of the workforce are SAWs who have not left agriculture in the number anticipated. The recent surplus of labor in agriculture is undoubtedly a function of the general economy as well. With unemployment high in other sectors there had been less opportunity for unemployed and under-employed farmworkers to find other work.

A phenomenon related to the influx of new workers which has been observed especially in my state of California is the increasing use of farm labor contractors. They provide useful services in bringing growers and workers together and they perform a variety of employment and managerial functions. Unfortunately, however, it appears that a portion of this cost is born by the workers who are generally paid less by contractors than they are when hired directly by growers.

I believe it is fair to say that the farm labor market today is characterized by a surplus of labor, working for wages and under conditions which have improved little, if at all, since before IRCA. This is not an auspicious starting point for advocates of foreign worker programs. Of course the argument is that the present state of this market is precarious. What will happen if the flow of unauthorized

workers is stopped or reduced and a rising economy draws workers out of agriculture? Will there then be a shortage which must be filled by authorized foreign workers? We cannot know with certainty. The size of the unauthorized population is not known and the demand for labor is difficult to predict in an industry subject to the vagaries of weather and biology.

Industry advocates say this is precisely why we need a standby program, ready to bring supplemental foreign labor in quickly to save crops in the event of an emergency.

Labor advocates argue that the domestic legal labor force may well be adequate, and that if it is not, more competitive wages and better working conditions would attract the needed workers.

Assuming need for the sake of argument, is it possible to have a temporary foreign worker program for an industry that does not undermine the position of U.S. workers in that industry? That is the policy of the H-2A program and the Panetta and Wilson guestworker proposals. I have reviewed the positions taken by the protagonists in the past and I imagine the debate will be much the same in the future.

Could industry and labor advocates agree again on a program that grants resident status and general employment authorization to a supplemental foreign workforce as they did in the SAW/RAW compromise? A comprehensive reform of our legal immigration system was enacted in 1990. Much of the Act deals with immigration for the purpose of employment and the temporary admission of foreign workers. A program for agriculture was not considered. Is Congress likely to pass an extension of the RAW program or any other foreign worker program for agriculture of this juncture?

I have concluded by posing questions which I think are central to our subject and look forward to the views of Messrs. Lake and Holt.

Outlook '93For Release: Wednesday, December 2, 1992

Farm Labor and Federal Immigration Policy--
Issues Related to An Immigrant Farm Labor Program

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Introduction

The agriculture industry in the United States has historically been faced with a need to supplement its domestic workforce, especially during peak harvesting periods. The difficulty in obtaining domestic workers is due to a combination of factors. First is the fact that domestic workers prefer the security of full-time employment in year-round agricultural jobs such as packaging and processing to the seasonal employment usually involved in many types of agricultural labor. Secondly, many domestic workers feel that the wages a grower can afford to pay are not sufficient to compensate for the exacting physical nature of the work and they would prefer to take a job with more status. On the other hand, from the viewpoint of the foreign worker, economic opportunities in the United States often surpass those available in their home countries.

The Bracero program is perhaps the best known Congressional response to this persistent workforce need in agriculture. The program lasted from 1942 through 1964 and was an attempt to alleviate the wartime shortages of farm labor. It was a temporary or non-immigrant worker program. It employed a total of between four to five million Mexican agricultural workers in the United States during its twenty-two year history.

The success of this program is hotly contested by those in agriculture and worker and union advocates. Agricultural employers felt that it efficiently supplied workers during periods of domestic shortages, while worker advocates claim that it provided inadequate wage and labor standards, due in part to inadequate funding and enforcement mechanisms. What is not debateable is that the Bracero program for many represents a lightning rod and point of reference for the debate over the need for alien agricultural workers and the best structure for such an alien worker program.

The Immigration Reform and Control Act of 1986 (IRCA)

During a period of economic recession in the early 1980s, Congress began debate over the issue of the significant uncontrolled flow of undocumented workers, largely from Mexico and Central America, into the United States. The proposed solution, based upon the Hesburgh Commission Report, was employer sanctions. Employer sanctions represented a significant shift in enforcement of immigration control from the Immigration and Naturalization Service (INS) to employers. Its premise was that employers should be penalized for knowingly hiring undocumented workers. If they are penalized, they will stop hiring illegal aliens and the job magnet in this country will be eliminated. Prior to this time, illegal aliens were routinely deported but employers were not penalized under federal law.

Given the prospect of employer sanctions, agricultural employers in the United States recognized the need for a viable program for the admission of alien workers to meet their labor needs. Although the H-2A temporary worker program existed at this time and had been used on a limited scale, many involved in perishable crop production believed a supplemental program was needed that was more structurally suited to the production and harvesting of perishable commodities. As a result a non-immigrant farm labor program (the so-called Panetta-Morrison amendment) was offered and passed the House of Representatives in 1984 and the Senate (as the Wilson amendment) in 1985.

The Panetta-Morrison and Wilson amendments were essentially the same and represented non-immigrant "guest worker" programs. They were structurally well-suited to the needs of the producers of perishable commodities with highly unpredictable labor needs, resultant in part from their sensitivity to variable weather and climatic conditions. These programs were highly controversial and were criticized by worker advocates as "Bracero" type programs with no labor protections that would lead to abuse of alien workers and depression of the wages and working conditions of domestic workers.

To the contrary, they were structured to avoid the weaknesses of the Bracero program by providing many more labor protections, a strict enforcement scheme, and authorization of sufficient funds to implement them. Nonetheless, the Wilson amendment to the immigration reform legislation threatened to kill the entire reform effort, largely because it was characterized, like the Bracero program, as a program that legalized "indentured servitude." Given the strong congressional support for a Wilson-type program, congressional

opponents needed to reach a compromise program to meet agriculture's needs. The issue of the immigration status of the alien workers to be admitted became the critical issue in the compromise process.

IRCA's Seasonal and Replenishment Agricultural Worker Programs

The solution to the congressional impasse was to change the Wilson temporary worker program into an immigrant program. The resultant political compromise converted the Wilson non-immigrant program into the Panetta-Berman-Schumer immigrant seasonal and replenishment agricultural worker program which was ultimately enacted as part of IRCA. See 8 U.S.C. Sections 1160 and 1161.

The seasonal and replenishment agricultural worker programs (called SAW and RAW) retained the same essential structure as the predecessor guest worker programs. Both approaches allowed the worker to move freely from employer to employer without a contract. They created a free market system where agricultural employers compete for the services of the available workers and afforded them the protections of federal and state labor laws. If, as often contended under the Bracero program, the employer did not comply with applicable labor laws, the worker had both legal remedies and the right to work for another employer.

The primary difference was in the legal status of the workers and the means of admission into the United States. Under the Wilson program, a worker would have been admitted on a temporary basis for a duration of less than a year based on the Attorney General's determination of the need for alien labor. This need was in part determined by grower petitions. Under the SAW program, an entire class of undocumented workers who could prove that they had worked ninety days in perishable agricultural employment during the year period preceding May 1986 qualified for temporary resident status. Assuming that other requirements were met, they would convert into permanent resident status and ultimately could qualify for naturalization as United States citizens. Over a million workers applied for the SAW program and a significant majority of them qualified.

The RAW program was a safety valve mechanism designed to provide a source for additional immigrant workers in the event the Departments of Agriculture and Labor determined that there was a shortage of workers available to work in perishable agriculture. Annual determinations have been made since fiscal year 1990 and no shortages have been found. The RAW program sunsets in fiscal year 1993.

Future Agricultural Worker Replenishment Programs

The immediate question the agricultural industry has to address is whether the RAW program or some other means of supplying alien workers should be enacted to meet future shortages. Those in the agricultural industry who pushed for the SAW and RAW programs clearly believe that a safety valve program should exist, regardless of the status of the agricultural labor supply today. The Commission on Agricultural Workers will be issuing its report to Congress on this and other issues shortly and undoubtedly the debate on these issues will ensue.

Although current assessments of the labor supply suggest that there is no current labor shortage, supply and demand can change rapidly, dependent on many variables. The industry feels that it is prudent to have an available mechanism should future labor shortages occur.

A significant factor influencing the supply of labor is INS enforcement of the employer sanctions and related document fraud provisions. Many experts contend that the current adequate labor supply exists in good part due to a large number of undocumented or fraudulently documented workers in agriculture. If INS increases its enforcement activity in this area, many feel the labor supply could rapidly change.

Conclusions

The SAW program successfully provided a legalized source of labor for the perishable commodity industry in response to the employers sanctions provisions of the law. To what extent was that success attributable to the immigrant nature of the program? Although it is difficult to provide an absolute answer to this question, following are some of the conclusions that can be drawn from the SAW program:

1. Although all alien labor programs for agriculture are inherently controversial, an immigrant program attracts considerable political support from worker rights groups who oppose what they view as the "indentured nature" of temporary or guest worker programs. Thus, the immigrant nature of the SAW program contributed to its successful enactment and implementation.

2. From the industry's standpoint, an immigrant program avoided the annual need to endure the labor certification process inherent in the H-2A and other guest worker programs. It is less expensive and burdensome for the employer.

3. An immigrant program allows the worker to move freely from employer to employer without the limitations of a contract-based system. This inherent element of an immigrant program is consistent with the needs of those in perishable agricultural production.

Although the perishable commodity industry considers the SAW program a success, it also believes that a temporary worker program can succeed. As noted above, the Panetta-Morrison and Wilson amendments were structurally similar to the SAW and RAW programs. Their primary differences were the non-immigrant status of admitted aliens and some petitioning and labor certification requirements.

Whatever form it takes, many in agriculture strongly believe that a supplemental program must be enacted to replace the RAW program which sunsets in 1993.

Outlook '93

For Release: Wednesday, December 2, 1992

THE CASE FOR A NON-IMMIGRANT FARM LABOR PROGRAM

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Introduction

As United States agriculture has industrialized, particularly since World War II, an important but little noticed characteristic of this industrialization has been the increasing separation of the management and labor providers in all sectors of industrialized commercial agriculture. This has resulted from both the increasing size of modern farm businesses and from the increased technological and managerial sophistication of agriculture. Hired agricultural work as a route to farming has all but disappeared. What has emerged is a commercial agricultural industry reliant on a non-managerial hired agricultural work force. The availability, productivity and cost of this hired work force is an increasingly significant factor affecting the profitability of domestic agricultural enterprise and its international competitiveness. The realization of this fact is slowly penetrating the public policy-making process.

Although fewer than half of the businesses defined as farms in the Census of Agriculture employ hired labor, these farms produce most of the Nation's agricultural output. In 1987 954,000 farms or 46 percent of all farms hired labor, and accounted for 84 percent of the value of agricultural sales. Hired labor expenses in 1987 accounted for 12 percent of all farm production expenses, more, for example, than fertilizer and other chemical products, interest on indebtedness, or energy inputs. Hired labor is especially important on vegetable, fruit and horticultural specialty farms, where hired labor expenses account for from 35 to 45 percent of farm production expenses. However, the largest share of aggregate farm labor expenses, 60 percent of the total, are incurred on livestock, dairy, poultry and field crop farms.

The number of persons who do hired farm work is difficult to measure because of the measurement complications arising as a result of seasonality of agricultural employment and the large number of multiple job holders who do some work in agriculture. In 1982, the most recent year the Census of Agriculture attempted to enumerate the number of workers hired, the Census enumerated 4.86 million hires on farms. Because many persons who do hired farm work work on more than one farm during the year, USDA

estimates the number of persons doing hired farm work in any given year (the hired farm work force) as a little more than 2 million.

The number of hired workers working in agriculture at any given time is smaller than the number of persons in the hired farm work force throughout the year. In 1991, peak hired farm employment was 1.5 million in July. Of this number, 1.1 million workers were employed directly by farmers and an additional 0.4 million persons who worked on farms were employed by farm labor contractors and other agricultural service employers. Hired farm employment has remained essentially level in the United States for the past 20 years. However the proportion of hired workers has increased while the proportion of self-employed and unpaid family workers has declined. In recent years the impact of labor saving technology and other productivity increases in agriculture has about been offset by the growth in agricultural production, particularly in labor intensive commodities.

Average hourly earnings of hired farm workers in the United States was \$5.79 in 1991. Average hourly earnings of hired farm workers increased 23.2 percent from 1986, the year the Immigration Reform and Control Act was passed. In contrast, the average hourly earnings of all private sector production workers increased only 18.0 percent during the same period. This relationship continued even in the most recent period, 1990-91, when farmworker average hourly earnings rose 4.9 percent while nonfarm worker hourly earnings rose only 3.2 percent. While average hourly earnings of hired farmworkers are still far below those of nonfarm workers, there has been a small improvement since 1986.

The H-2A Temporary Agricultural Worker Program

Programs for the temporary admission of nonimmigrant aliens to the United States to perform agricultural labor or services have been a part of U.S. immigration law for more than 70 years. The longest standing of these is the H-2 program which was originally enacted as part of the Immigration and Nationalities Act of 1952. Section 301 of the Immigration Reform and Control Act (IRCA) of 1986 codified much of the H-2 temporary agricultural worker regulatory program and redesignated it the H-2A program. Congress intended to "streamline" the H-2A program to assist growers who encountered labor shortages, including shortages that might arise as a result of the enactment of IRCA.

The H-2A program authorizes the temporary admission of nonimmigrant aliens to perform agricultural labor or services of a temporary or seasonal nature if; (a) there are not sufficient eligible U.S. workers who are able, willing and qualified to perform the labor or services, and who will be available at the time and place needed, and (b) the employment of the alien(s) in such labor or services will not adversely affect the wages and working conditions of similarly employed United States workers.

For these purposes, a "U.S. worker" includes not only citizens and permanent resident aliens, but all other persons who are legally authorized to work in the United States.

The administrative mechanics of the program are complicated. In order to secure the admission of H-2A aliens, an employer who anticipates a shortage of U.S. workers must first file an application for an alien labor certification with the U.S. Department of Labor together with a job offer for U.S. workers. If the job offer meets the criteria of the Labor Department, that is, the wages and terms and conditions of employment are such that it will not adversely affect U.S. workers, the Department will accept the application for consideration and the employer and the Department will attempt to recruit domestic workers for a period of 40 days. To the extent that sufficient qualified U.S. workers are not found to fill the employers jobs during this domestic recruitment period, 20 days before the employer's date of need for workers the Department of Labor will issue a labor certification for sufficient aliens to make up the difference between the employer's need for workers and the number of qualified domestic workers available.

The terms and conditions of employment an employer is required to offer so as not to adversely affect U.S. workers are comprehensive and expensive. The most important are the following: The employer must pay the higher of (a) the prevailing wage in the occupation and area of employment, or (b) an Adverse Effect Wage Rate, which is equivalent to the annual average hourly earnings of field and livestock workers in the state or region as determined in annual surveys of the U.S. Department of Agriculture. The employer must also provide housing that meets Federal OSHA standards at no cost to the worker, must reimburse the inbound transportation costs of workers who complete at least 50 percent of the work contract period and pay return transportation to those who complete the work contract, must provide all necessary tools and equipment at no cost to the worker, and must guarantee the worker employment for at least three-quarters of the contract period. In addition to the pre-certification domestic recruitment requirement, the employer must continue active recruitment of domestic workers until the aliens have started travelling to the employer's jobs, and must continue to accept and employ qualified U.S. workers who apply for the employer's jobs through the first 50 percent of the work contract period.

If an employer receives a labor certification from the Department of Labor, and the employer wishes to employ aliens to fill the employer's unfilled jobs, the employer must file a petition together with the labor certification with the Immigration and Naturalization Service (INS), seeking admission of H-2A aliens. The aliens must be recruited by the employer. The aliens are admitted and authorized to be employed only by the employer filing the petition and only in the occupation and for the period of employment for which the employer has a labor

certification. The employer must comply fully with the terms and conditions of the job offer, both with respect to the aliens and any U.S. workers employed in the certified occupation. At the end of the work contract period, the aliens must either depart the United States or may be approved to be employed on a new H-2A contract for the same or another certified employer if a new labor certification has been issued. A temporary or seasonal job eligible for H-2A certification may last up to one year, though typically they are for a much shorter period. An alien may remain in the United States working on a sequence of H-2A contracts for up to 3 years continuously, though typically H-2A aliens stay in the U.S. for less than a year at a time.

Most agricultural employers participate in the H-2A program through employer associations which act as an agent for their employer members, or occasionally as a joint employer with their employer members. The association will typically handle the substantial paperwork and negotiation involved in the application for labor certification and the INS admission petition, and conduct domestic and foreign worker recruitment on the employers' behalf. The association also frequently coordinates the transportation of workers to and from the H-2A jobs and their transfer to new H-2A petitions. Under most circumstances it is difficult and expensive for individual small employers to successfully access the H-2A program. Even where an association is involved, a critical mass of workers needs to be involved before such a program can be economical for employers.

The Case for A Non-immigrant Alien Admission Program

At the time IRCA was enacted, it was anticipated that there would be a huge increase in the use of H-2A workers over the approximately 20 thousand H-2 aliens who had been employed during the preceding decade. In fact, the program has expanded very little, from 20,682 positions certified in 1985 to 25,412 in 1990. More than 3000 individual employers are represented among the applicants. In 1990, H-2A job opportunities were certified in 36 states, but the preponderance of certifications were on the eastern seaboard. The most common occupations certified are sugar cane cutting, apple and other soft fruit harvesting, tobacco and vegetable harvesting, and irrigating and shepherding in the western states. The principal expansion in H-2A certification activity since the enactment of IRCA has been in eastern seaboard tobacco and vegetable occupations, and among traditional users of the program.

Programs for the admission of aliens to perform farm work, especially the H-2A program in recent years, have been strongly opposed by farm worker advocates. Since the termination of Public Law 78 -- the "Bracero" program -- in 1964, the H-2 and H-2A programs have been targets of litigation by publicly funded legal service groups. This litigation, and the still widespread availability of illegal aliens, has been a significant factor in keeping the number of H-2A applications and certifications low.

The high cost of the H-2A program and the slow and cumbersome bureaucratic procedures involved in securing labor certification were primary factors fueling the search for an alternative alien agricultural worker program as immigration reform and employer sanctions legislation began to become a political likelihood in the early 1980's.

Will an alien worker admission program continue to be necessary? The answer is, at best, highly uncertain. There is nothing to suggest that the decades long trend toward declining participation of U.S. workers and newly legalized aliens in hired agricultural work will not continue, although the rate of movement of workers out of agriculture is clearly affected by the availability of jobs in the non-agricultural economy. An important question is whether the government will successfully control document fraud and/or illegal border crossing. The likelihood seems low, but there is little doubt that a successful border interdiction program, or a program to verify the authenticity of employment eligibility documents or to replace them with a counterfeit-proof identity and work authorization document, would change the current agricultural labor supply situation overnight from a modest surplus of workers to a severe shortage. Finally there is the reality that increasing worldwide production and trade in labor intensive agricultural commodities, including fruits, vegetables and horticultural specialties, will require U.S. producers to remain competitive in both foreign and domestic markets, precluding significant rises in domestic labor costs for production and distribution.

With regard to admission of alien workers, the public policy choice seems clear. The large and expanding international trade in labor intensive agricultural products has effectively established world markets and world market prices for these commodities. Thus, the policy choices available to the U.S. if we are not going to close our borders to agricultural imports are (1) to admit seasonal alien farm workers under conditions that permit the maintenance or growth of current U.S. production of labor intensive agricultural commodities, or (2) to restrict admission of alien agricultural workers. The later option, assuming effective control of illegal immigration, will entail reducing the domestic production of labor intensive agricultural commodities to that level at which sufficient U.S. farm workers are available to produce competitively at world market prices. That will almost certainly require a significant reduction in domestic production, and a reduction in the employment of U.S. workers on farms and in ancillary services supported by that production. Although policies to restrict alien farm worker admissions are generally argued on the grounds that they will improve the conditions of domestic farm workers, little or no change in the wages or earnings of domestic farm workers is likely because of competitive world markets. That is because international competition will preclude significant increases in labor costs by domestic producers. Thus the principal benefit to the U.S. from continuing to admit alien seasonal farm workers is

to facilitate a larger volume of domestic agricultural production and higher levels of U.S. worker employment in nonseasonal farm and ancillary jobs.

Outlook '93

For Release: Wednesday, December 2, 1992

INTERNATIONAL DIMENSIONS OF U.S. FORESTRY

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In the past 20 years, and especially in the past decade, increasing public attention has been paid to a variety of global environmental issues. Climate change, ozone depletion, and the elimination of species are by now familiar topics. To these truly global issues must be added regional and local environmental issues such as the impacts of industrial pollution; often these become international issues by crossing national boundaries. We have come to recognize that the consequences of our actions can be widespread and accumulate over time; we affect and are affected by conditions around the globe. As a result, it is no longer sufficient to formulate environmental policies focused strictly on domestic conditions. It is also not possible to unilaterally formulate policies addressing global problems: environmental issues are part of international politics.

Forestry issues provide examples of these developments. Nearly all of the "big" issues of the global environment involve forests: deforestation contributes to loss of species and accumulation of atmospheric carbon; commodities from forests support economic growth and social development in developing countries; the distribution and character of forests are likely to be affected by significant climate change; reforestation and afforestation can absorb carbon emitted by combustion of fossil fuels. Forests are at the center of global environmental issues because they are a fundamental component of solutions to the challenge of establishing a sustainable balance between human activity and the integrity of global environmental systems. Forests play a critical role in sustaining global environmental systems; forests also play a direct role in sustaining human communities and economies by providing fuel, food, commodities, and income. As a result, forests are receiving unprecedented attention in international environmental debates; the importance of forests has never been more widely recognized, and the challenges for development of public policies have never been greater.

One of the consequences of increased international attention to the broad questions of forest use and condition has been a merging of domestic and global issues; the rhetoric and content of domestic debates is now strongly influenced by debates in the global arena. For much of the past century, conflicts over management and use of public

resources have been increasingly nationalized: local interests are less and less able to control resource use. Identification of global forestry issues takes this process one step further. Forest resource use and management in all countries is now a legitimate subject for international discussion. The United Nations Conference on Environment and Development (UNCED) and its forest documents such as the Forest Principles emphasize this point.

There are at least two interesting results from this process. First, in the effort to prepare documents based on a multinational consensus, developed countries have been challenged to practice at home what they preach abroad. Second, and following directly from the first, global forestry issues have quickly expanded beyond tropical deforestation. Initially, this complicates the global forestry agenda to the point of overwhelming it; eventually it should help to clarify and simplify the agenda as the full scope of issues is identified and boundaries between global, regional, and national issues are discussed and defined. It is in this context that a discussion of international dimensions of U.S. forestry is appropriate and timely.

This paper focuses on broad, international environmental policy dimensions of U.S. forestry. These dimensions include the importance and condition of U.S. forests relative to global forests, the effects of both public and private domestic activities on forests of other nations, and U.S. objectives in, and approaches to global, multinational, and bilateral forestry problems. Following a brief summary of world forest resources, selected U.S. forest data will be reviewed and compared to world data. Then two questions will be considered. First, does the United States export environmental problems to developing country forests? Second, can the United States experience in managing forests be exported to the benefit of developing countries?

Summary of world forest resources

In order to place U.S. forests in a global context it is necessary to briefly review recent data and trends in world forest resources. Based on data compiled by the Food and Agriculture Organization (FAO 1992a) and the United Nations Economic Commission for Europe (UN-ECE 1992), forests now cover just over 4 billion hectares (about 10 billion acres) of the earth's surface. These data include all types of forests: closed and open natural forest, forest plantations, and other woodland. Inclusion of shrub vegetation and forest fallow would increase this figure by more than 1 billion hectares. At the time of their maximum distribution, forests are estimated to have covered about 5 billion hectares.

The majority--as much as two-thirds--of this area is classified as "closed natural forest." Natural forest does not refer to conditions that are free of human influence. In fact, human use and management have had a significant role in shaping most of these forests. In this context it is most useful to think in terms of a spectrum of management: at one

end is a set of conditions considered to be "natural"--or nearly so. At the other end of the spectrum are forests resulting from intensive management focused on a few species, in some cases species that are not native to the location. These are typically termed "plantations." Estimates of the area of plantation forest vary due to use of different definitions; even using the broadest possible definition, plantations cover about 100 million hectares--less than 3 percent of world forest area.

It is useful to organize world forest resource data in at least three different classifications: geography, ecology, and demography. Beginning with geography, table 1 summarizes forest area data by major region or country. The United States, Canada, and Russia have more than 40 percent of the world's forests; Russia alone accounts for nearly one quarter of the world's forest area. Latin America, dominated by Brazil, accounts for a nearly equal share of world forests.

Because concern for changes in ecological conditions underlies many prominent global issues, we must also look at the distribution of forests by broad ecological zones. And because social and economic factors are often the dominant factors that determine patterns and intensity of resource use, we must also consider the distribution of forests in relation to patterns of economic development. Table 2 displays these ecological and demographic dimensions of global forest resource data.

Well over half of world forests are in the temperate zone; the remainder are in the tropical zone--the broad band around the equator. Of the temperate zone forest, about half is in the boreal zone of the north; Kuusela (1987) calls the boreal forest the "evergreen crown of the globe." World population is about equally distributed between temperate and tropical zone forests. Tropical zone forests are noted for their variety of species and ecological complexity; moist tropical forests, including tropical rain forests, account for three fourths of all tropical forests and 30 percent of world forests.

Although attention to deforestation focuses on moist tropical forests, the importance of temperate forests in supporting global biodiversity and providing global environmental services is increasingly being recognized. Temperate rain forests, for example, are recognized as ecologically complex, highly productive, and an important component of regional and global environmental systems (Norse 1990; Ecotrust 1992). Expectations for provision of environmental services are simply being added to--not substituted for--what is already expected from world forests.

Data showing the change in forest area over the past decade provide a striking explanation of concern over conditions in tropical forests. Globally, forest area is declining at a rate of about 3 percent per decade. A modest expansion of the temperate forest, primarily in the Northern Hemisphere, does not offset loss of tropical forest area. Tropical forest area declined by about 170 million hectares--nearly 10 percent--in the past decade, and by more than 100 million hectares in the previous decade. Deforestation rates are spectacular in some tropical countries, and local impacts are

severe. Nevertheless, more than half of the total loss of tropical forests occurs in countries with the largest reserves. As dramatic as they appear, current rates of forest loss must be seen in historical perspective. Deforestation in the tropical zone is a relatively recent phenomenon; well over half of the 1 billion hectare reduction in world forest area resulting from the expansion of agriculture and communities has come from the closed forests of the temperate zone (Repetto and Gillis 1988). Nearly all of this occurred prior to the twentieth century.

The most significant factors affecting world forest resources are population and the expansion of agriculture; land tenure, methods of agricultural production, patterns and rates of economic development, and consumption of commodities are other important factors (Repetto and Gillis 1988). World population more than doubled in the last four decades (1950 to 1990); the population growth rate for developing countries is nearly three times that of developed countries. Not surprisingly, rates of tropical deforestation and population growth are highly correlated (Allen and Barnes 1985). Developing countries concentrated in the tropical zone have nearly four fifths of world population and barely half world forests. These forests are used for fuel, converted to agricultural production on a subsistence basis and, increasingly, are used to produce agricultural and industrial commodities for domestic consumption and export. Developed countries have a significantly richer endowment of both forest resources and productive agricultural land.

Comparing U.S. and world forest data

Table 3 summarizes selected data for U.S. forests and compares them to world data to provide a starting point for considering U.S. forests in a global context. More importantly, data such as these begin to form the basis for measuring U.S. "performance" relative to the UNCED forestry principles. In broad terms, these principles have the objective of promoting the "conservation and rational utilization of forests."

To European settlers of the 17th and 18th centuries, one of the most striking features of North America was the extensive forests covering more than 400 million hectares (1 billion acres) of what was to become the United States. Half of the country was forested. Today, the United States has nearly 300 million hectares (730 million acres) of forest, over 30 percent of its land area; this amounts to about 7 percent of world forests. The United States has about 13 percent of the world's temperate forests. By the simple measure of forest area per capita the United States, with only 5 percent of world population, remains well endowed with forests. However, little of the forest that existed in the 17th century remains; less than 10 percent of the U.S. forest area is undisturbed by recent human use or management (Szaro 1992).

Well over half of U.S forests are privately owned, reflecting an important aspect of the U.S. approach to forest management. The United States accounts for about 40 percent

of the world's private forests. Reliance on privately owned and managed forests is greater only in the Nordic countries--where the relative importance of the forest sector in national economies is considerably higher as well. Private ownership of forests is very small in Canada, although some public forests are privately managed on a long-term basis. About one half of the area of European forests, and 20 percent or less of the forest area of tropical countries is privately owned.

Relative to the rest of the world, a higher proportion of U.S. forests, both public and private, are managed; "managed" refers to some degree of control over forest use (World Resources Institute 1992). Half of the closed forest area of the United States is managed; world-wide, one third of closed forests are managed (World Resources Institute 1992). Nearly all of the closed forests of Europe are managed. The United States also reserves from exploitation a significant portion of its forests; about 10 percent are removed from timber production to provide other services such as conservation or recreation. The United States accounts for about one quarter of world forests in this category, and accounts for nearly half of protected, closed forests in the temperate zone (World Resources Institute 1992).

In the last decade, the forest area of the United States declined by about 2 million hectares, less than 1 percent. Some land was removed from agricultural production and reforested, but this did not offset conversion of forests to urban uses. Loss of another 7 million hectares of forest is expected over the next two decades; nearly all forest conversion will be to uses other than agriculture, primarily to support urban development (USDA Forest Service 1989). The decline in forest area in the United States is quite small compared to total world deforestation. The United States accounted for about 1 percent of the net loss in forest area over the past decade. However, the decline in U.S. forest area contrasts sharply with trends in other developed, temperate zone countries. Over the past four decades, forest area increased in Europe (especially France, Germany, and the United Kingdom), and in Japan.

Globally, timber remains the primary product removed from forests (World Resources Institute 1992). The U.S. share of world timber inventory is proportional to its share of world forest area, but the U.S. share of timber production is significantly higher. The United States produces one fourth of the industrial timber harvested in the world and sustains high rates of timber production across diverse forest types, at a scale greater than any other country, and in support of diverse forest industries. Sustained production on a national basis has depended, in part, on the ability of timber using industries to shift among regions within the United States. Nevertheless, measured in terms of harvest volume per hectare of exploitable forest, U.S. rates of production are equalled in some European countries, but are exceeded in few.

U.S. accomplishments in managing forests and producing forest products are overshadowed only by our appetite as consumers of forest products. On a per capita

basis, the United States consumes timber at more than double the average for developed countries, and more than four times the average for developing countries. Relatively high rates of timber consumption reflect U.S. wealth--measured in terms of income and abundant forests--and patterns of social development. Like a few other heavily-forested, developed countries, and unlike many other developed and developing countries, the United States consumes timber in place of other materials in a wide variety of uses. The United States consumes nearly 30 percent of the world's production of industrial timber. The United States is a net importer of forest products, however, and is the world's leading importer of forest products. At the same time, we are also one of the leading exporters of forest products.

Finally, consider U.S. public spending on natural resource management, including forest management and protection. Annual federal and state expenditures are substantial, measured in billions of dollars. U.S. expenditures represent a significant proportion of world expenditures, perhaps as much as 40 percent. These data do not include any estimates of costs of managing private forests. The U.S. share of forestry research expenditures, public and private, is about 20 percent of the world total (National Research Council 1990, 1991). Although these amounts and shares are substantial, U.S. expenditures are not the highest among developed countries in terms of share of Gross National Product, or expenditures per hectare of forest. Nevertheless, the scale of effort is an important contributor to U.S. accomplishments in terms of management, productivity, and conservation of forests.

Environmental Problems: a U.S. Export?

Two issues can be used to illustrate specific international dimensions of U.S. forestry. First, in the course of recent debates over management of domestic forests, international environmental impacts have been included among a number of criteria for judging "best" policies (Bowyer 1992; Schallau and Goetzl 1992). U.S. management practices are sensitive to environmental concerns and U.S. timber production may be more environmentally benign than timber production in other countries. This may be especially true when U.S. practices are compared to practices used in some tropical developing countries. Although timber harvesting in old growth forests of the Pacific Northwest has recognized environmental impacts, an objective of minimizing total (global) impacts may lead to continued timber production from these forests (Schallau and Goetzl 1992). To do otherwise, it is argued, would simply export environmental impacts to other countries, especially developing countries.

The chain of reasoning in this argument begins in the observation that importing commodities to sustain consumption is one, usually implicit timber supply policy choice. When faced with a possible imbalance between demand and supply, other broad categories of policy choices include increasing production, increasing the efficiency of use, reducing timber consumption through substitution of other materials (whose

environmental impacts must be considered), and reducing activities that consume timber. Policies that address consumption are not typically considered when debating timber availability problems (Cubbage and Brooks 1991).

The United States is a net importer of timber, and decreases in domestic timber production may result in increased imports to satisfy consumption requirements. However, there are a number of weaknesses in the argument that possible degradation of third world forests provides a basis for maintaining timber production in the face of competing domestic interests or conflicting domestic objectives. First, most U.S. imports are from Canada. Although environmental pressures on Canadian forests are increasing, forest products industries continue to be a substantial component of the Canadian economy. And it is difficult to argue that Canada is not capable of practicing resource management that balances domestic environmental and economic objectives.

Second, the United States is a relatively minor participant in markets for the timber products of tropical developing countries, and tropical timber is a small component of U.S. consumption. Table 4 summarizes 1990 data on major markets for tropical timber. The United States accounts for nearly all North American imports of tropical logs, lumber, and plywood; however, North America accounts for only 7 percent of consumption of tropical timber in these major markets. Even taking into account U.S. imports of goods manufactured from tropical timber and exported by Taiwan and Korea, the U.S. role in tropical timber markets is a small one, at best. Tropical timber accounts for less than 1 percent of total U.S. consumption of industrial forest products. In addition, industrial products from tropical forests are seldom used as substitutes for commodities manufactured from temperate, coniferous forests.

Finally, there is only an indirect link between the implied consequence (tropical deforestation) and production of industrial timber products from tropical forests (Poore 1990). To the extent that changes in U.S. domestic policies do result in increased consumption of tropical timber, it is also necessary to consider social and economic benefits accruing to tropical countries from incomes earned in tropical timber trade. Forest products exports by tropical countries were valued at more than \$10 billion U.S. dollars in 1990 (FAO 1992b). These economic benefits may have positive consequences in terms of the overall environmental impact of development. A complete calculation of impacts should consider global economic as well as environmental effects.

The calculation of global environmental impacts is a practical as well as ethical basis for resource policy (Bowyer 1992). It is also true that the United States consumes a disproportionate share of the world's resources, including timber. But the U.S. forest sector consumes primarily coniferous timber, and the major source of supply for U.S. consumption continues to be North America. Therefore, it is not possible to make a strong case that reductions in harvest on public lands in the United States will have a significant impact on tropical or other developing countries. In fact, when all forest

products--pulp and paper products as well as solid wood products (logs, lumber, etc.) are considered--the United States is a net exporter of forest products to tropical countries.

Exporting U.S. Experience

Consider the following description of forest conditions:

- More than 1 million hectares (2.5 million acres) of forest converted to agricultural production annually; cumulative reduction in forest area exceeding 75 million hectares.
- More than 50 percent of timber harvested is used for fuel; wood provides about half of all energy consumed.
- Numerous species are eliminated or threatened by loss of habitat and destructive exploitation.
- Frequent, severe fires destroy forests, leading to soil erosion, loss of productivity, and damage to watersheds and aquatic habitat.

Although this could easily describe current conditions in a number of tropical developing countries, these data refer to the United States at the end of the 19th century. Looking at conditions of U.S. forests one hundred years later it is tempting and perhaps natural to consider offering the U.S. experience as a model for developing countries. Before doing so, however, we must examine U.S. forest conditions closely, and we must consider carefully how well U.S. experiences can be generalized and transferred.

First, forest conditions in the United States may be more ambiguous than a cursory glance would suggest. For example, reliance on private management may favor production of tangible (marketable) commodities at levels more beneficial to current as opposed to future generations. A high proportion of managed forests is cause for alarm among those who equate management with ecosystem simplification and other conditions that differ from unmanaged, undisturbed forests.

In addition, many aspects of U.S. experience with forests--or, more broadly, the experience of developed, temperate zone countries--may not be relevant to tropical developing countries. For example, Kuusela (1992b) describes the positive consequences of shifting cultivation on the boreal forests of Finland and Russia. This pattern of use characterized 50 to 75 percent of Finland's forests prior to the twentieth century. Trees that would otherwise have been replaced through succession were perpetuated, resulting in good soil fertility, and diverse plant and animal communities (Kuusela 1992a). Whether similar types of forest use in the tropics could produce similar results is a matter of debate and uncertainty. Although some argue that human-caused canopy

openings in the tropical forest result in similar increases in diversity of landscapes, plants, and animals, low intensity shifting cultivation is no longer the typical human use of tropical forests.

In many--but not all--respects, U.S. forestry represents a positive role model; however, it is important to examine the factors that contributed to the difference between U.S. forests today and the forests of 100 years ago. The forestry accomplishments of the United States have been based on good fortune, temperate forest biology, and the strength of U.S. institutions.

- The wealth of the initial endowment of land resources, both agricultural and forest provided a significant reserve for an expanding, industrializing country. Our ability to draw on and adapt to the diverse forest resources of half a continent provided opportunities to begin inefficiently, to learn as we went along, and to apply the lessons learned. Fortuitous developments in agriculture, transportation, and the structure of the economy had enormous, beneficial impacts on forests.
- The forest resources themselves have proven to be largely resilient ecosystems, capable of producing a broad range of products and services. Temperate forest ecosystems are capable of adapting to significant alterations in patterns and intensities of disturbances and, under a broad range of conditions, are capable of regenerating naturally to productive forests. It is not clear that tropical forest ecosystems share these biological characteristics.
- The United States developed powerful, stable, social and political institutions; prominent among these are the significant role for private ownership and management, the importance of free markets, and the use of a variety of policy tools implemented by a diverse public sector, federal, state and local.

If we recognize these as elements in U.S. success with forests, we must then consider how often similar conditions are found among tropical developing countries. Aspects of U.S. experience that can form the basis of efforts to export U.S. success include the importance of stable social and political institutions governing uses of forest land, and the importance of developments outside the forest sector. Efforts to effect change in forest conditions in developing countries may need to focus most attention on policies outside the traditional domain of the forest sector and forest policy.

Summary

What conclusions can we draw--if any--regarding the international dimensions of U.S. forests? Are there lessons for other countries? Are there lessons for the United States as we participate in technical and political discussions of global forestry issues? Such discussions cannot begin with an expressed or implied endorsement of conditions or

policies affecting U.S. forests. Nor is it appropriate to minimize the extent and magnitude of change in U.S. forest conditions. The U.S. approach to discussions of global forest resource conditions must also recognize the connection between levels and patterns of consumption and ecological consequences. Although the connection to tropical forests is not a strong one in terms of forest products, U.S. consumption of a variety of agricultural and industrial products has wide-reaching, profound impacts on the economies and resources of developing countries.

Through an understanding of the scope and importance of U.S. accomplishments, and the extent to which factors important in determining conditions in U.S. forests can--or cannot--be replicated elsewhere, we can effectively participate in debates concerning global forests. Only then will we better understand implications of international resource issues for U.S. forestry, and identify circumstances where the transfer of U.S. forestry experience to other countries is both relevant and welcome. At the same time, our increasing awareness of the global context in which our forests, communities, and economy exist will inevitably change the ways we use and manage our own resources. Forest policies and programs in the United States must ultimately recognize both directions of impact in order to fully reflect international dimensions of U.S. forestry.

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Table 1--World forest area by geographic region in 1990, and estimated change in area 1980-90

Region	Area	Change in area 1980-90
<i>Million hectares</i>		
United States	296	- 2
Of which:		
North	69	
South	82	
West ^a	145	
Canada	453	nc
Europe	195	14
Russia ^b	942	12
Africa	604	-50
Asia ^c	651	-36
Latin America	919	-83
World	4,060	-145

nc = no change

^a Includes Alaska and Hawaii.

^b Includes all states of the former Soviet Union.

^c Includes Oceania (Australia, New Zealand, and Papua New Guinea).

Source: FAO (1992a), UN-ECE (1992), Waddell and others (1989); U.S. data are for 1987.

**Table 2--World forest area, population, and forest area per capita
by ecological zones and stage of development, 1990**

	Forest area		Population	Forest area per capita
	Total	Change 1980-90		
	<i>Mil. hectares</i>		<i>Millions</i>	<i>Hectares/cap.</i>
Temperate zone	2,330	24	2,849	0.80
Of which:				
Developed countries	2,060		1,265	1.62
Developing countries	270		1,584	0.17
Tropical zone	1,730	-169	2,473	0.70
Total	4,060	-145	5,293	0.80
Developed countries	2,060		1,265	1.62
Developing countries	2,000		4,057	0.49

Sources: FAO (1992a), UN-ECE (1992).

Table 3--Selected forest data for the United States, with comparisons to world data

Item	Amount	U.S. share of world
	<i>Mil. hectares</i>	<i>Percent</i>
Forest and woodland	296	7
Closed forest	226	8
Private forest	163	40
Managed closed forest	102	11
Protected closed forest	31	26
Annual reforestation	2	17
Deforestation	0.2	1
	<i>Bil. cubic meters</i>	
Timber inventory	21	7
Timber production		
Total	0.5	16
Industrial products	0.4	25
Timber consumption		
Total	0.6	17
Industrial products	0.5	28
	<i>Billion dollars</i>	
Expenditures on:		
Resource management ^a	6.8	40e
Forestry research	0.3	20e

^a Including parks.

Sources: World Resources Institute (1992); Food and Agriculture Organization (1992a); Waddell and others (1989), National Research Council (1990, 1991), and estimates.

Table 4--Net imports of tropical timber products in major markets, 1990

Product	North America	Japan	Europe (EEC)	Taiwan and Korea ^a
<i>Thousand cubic meters (roundwood equivalent)^b</i>				
Logs	3	11,319	3,303	7,924
Sawn wood	364	2,468	5,569	1,057
Veneer	46	222	435	25
Plywood	2,528	6,251	2,369	2,240
Total	2,941	20,260	11,676	11,246

^a Taiwan data are for 1989.

^b Conversion factors (m³ roundwood per m³ product) are: sawn wood, 1.8; veneer, 1.9; and plywood, 2.3.

Sources: International Tropical Timber Organization (1991), Stichting Bos en Hout (1991), Wood-Products Stockpile Corp. (1991), Foreign Agricultural Service (1990).

Outlook '93

For Release: Wednesday, December 2, 1993

EXPORTS OF BASIC TIMBER RESOURCES: WHO WINS AND WHO LOSES

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The United States is the world's leading producer and consumer of forest products and is second only to Canada as an exporter of forest products. This important trade feature is not a new trend for the United States. Exports from the forests of this country have played a critical role in its historical economic development. Seventeenth century New England exported such commodity products as fuelwood to the West Indies sugar mills and tree length logs to England for ship masts. In the 19th century, timber exports played a vital role in the economic development and growth of the Western United States. Waterborne exports of lumber, sawn squares, and logs continue to be an important trade feature of the Pacific Northwest.

Today, however, increasing trade of basic wood resources has raised concerns about domestic wood product prices and the ability of U.S. forests to continue to adequately supply domestic and world markets. Thus, the following discussion will examine some of these issues and provide insight into answering the question of winners and losers in the export trade of softwood and hardwood logs and chips.

Information on softwood resource production and export has previously been compiled and disseminated by Dave Darr and Richard Haynes; hardwood log resource production and exports were provided by William Luppold.¹

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Log and chip exports represented just over a third of the value of solid wood exports in 1991. However, all except hardwood chip exports peaked between 1989 and 1990, declining in 1991 and remaining relatively flat for 1992 (Figure 1).

Softwood Log Exports:

Softwood log exports dominate these four product categories in terms of both volume and value. Exports are predominantly from the Pacific Northwest to Japan. In 1991, over 70% of softwood log shipments went to Japan to supply construction material. Concerns over the impact of softwood log exports on the domestic industry have existed for some time and resulted in legislation restricting round log exports from public lands.

The arguments over who wins and who loses in the exportation of softwood logs have been well documented in the press, in the state and federal legislatures, and in academic halls. They go as follows:

- (1) Domestic mills, particularly near ports, face reduced log supplies and higher raw material prices. This situation causes a reduction in profits and employment by domestic mills, potentially higher lumber prices to consumers, and increased lumber imports from Canada.
- (2) Exports are restricted to private lands, thus shifting domestic demand to public timber supplies. This puts greater pressure on public lands to produce timber, raising concerns over increasing timber production from a finite land base.
- (3) Exporting our timber inventories today, forecloses future trade income and economic welfare gains.

The winners from the log export trade are as follows:

- (1) Log exporting has become a significant industry segment of its own, with related local and regional economic activity and creation of expanded employment opportunities.
- (2) Log exports increase profits to landowners - benefiting local economies, and increasing incentives for forest management on nonindustrial private lands.
- (3) The high value of export logs helps to reduce the U.S. deficit in balance of payment with Japan and other countries.
- (4) Free trade is preferable economically because restraints encourage remedial reactions by our trading partners.

These issues continue to be important and dominate arguments on the export trade of wood raw materials.

Softwood Chips:

Softwood chip exports are once again predominantly from the West Coast of the United States to Japan. However, these exports are not heavily debated since overseas markets provide outlets for mill residues, thinnings, and salvage material.

Exports of softwood chips have held relatively stable since 1988. The value of softwood chip exports declined by 5% in 1991 and may not show significant increases in the near future due to increased trade of softwood chips between Chile and Japan.

Although the West Coast dominated softwood export trade, hardwoods are shipped from East Coast and Gulf Coast ports as well as West Coast ports. Hardwood resource exports have not had the historical significance of softwoods and until recently were relatively small compared to the softwood trade. However, concerns over regional impacts due to increased log exports from New England and chip exports from the South have initiated debate over the pros and cons of exports similar to those in the PNW over softwood log exports. Since this is a recent concern, this paper will focus on the export of hardwood resources.

Hardwood logs:

After showing significant gains in export value between 1987 and 1989, the value of hardwood logs has remained relatively stable.

The hardwood log export market differs from that of softwood logs in several important ways:

- (1) Markets are not concentrated in Asia, but are worldwide.
- (2) Three basic log products, veneer logs, sawlogs, and pulp logs, are used in a wider variety of end products and specialty markets.
- (3) High value specialty markets exist which offer significant premiums for high quality logs.
- (4) Export quality logs require longer rotation periods than softwoods.

Japan is not the only dominant market for hardwood logs, except for red alder and paulownia. Significant export markets exist in Canada and Europe, as well as Korea and Taiwan in the Pacific Rim.

Due to proximity, Canada is and has been the largest export market on a volume basis for U.S. produced hardwood logs. However, the quality of logs shipped to Canada is lower than the products exported to Asia and Europe. Recent statistics indicate that northern species such as maple, beech, birch, and aspen account for the majority of logs exported to Canada.

Many northern sellers of logs consider Canada an extension of their U.S. markets. Log export restrictions would be difficult under the current free trade agreement between the United States and Canada. In addition, if log export restrictions applied to overseas markets only, logs could first travel to Canada and then be re-exported to European and Asian markets. If this happened, U.S. sellers of hardwoods would not receive all of the gains from the premium prices these markets offer.

While Canada is the largest market on a volume basis, Europe has been and still is the largest export market for high-grade veneer logs which receive premium prices in these markets. As exports of logs to Europe have fluctuated, there has been a continuous change in the species exported which causes the impact on the domestic market to fluctuate.

Currently Germany and Italy are the major European markets for hardwood logs. The dominant species exported include white oak, cherry, and walnut. These markets prefer timber grown in the north-central and northeastern regions of the United States. This preference has apparently influenced the price of veneer logs in northern regions. However, the impact exports have on price is difficult to fully assess because veneer logs are not commodities with well-defined market prices. Transactions are usually conducted on an individual log or small lot basis.

Logs exported to Asia range from high grade veneer logs to pulpwood, including medium and high grade sawlogs used for lumber production. In the early 1980's Japan was the only significant Asian market for U.S. hardwood logs, however, growth in the Taiwanese furniture industry increased exports to that country by the mid-1980's along with exports for Korea.

Japan is the major market for two underutilized species in the United States-- Paulownia, a low value weed species and west coast red alder. Paulownia is sawn into lumber and red alder is sorted for pulp production with the better grade logs going to sawmills.

As can be deduced from the variety of products and markets involved in hardwood log exports, it is difficult to make broad generalizations concerning "winners" and "losers". Heading up the "loser" categories are both domestic wood producers and environmental interests concerned over the adverse impacts of increased harvest for exports.

However, unlike the softwood log export scenario, there are no large industrial ownerships involved with growing and managing timber resources for hardwood production. Thus, the nonindustrial private landowner plays a more important role in the log export picture, providing the majority of material for export and benefiting from the premium prices offered by overseas markets. This is particularly true in the North Central and Northeast where land ownerships are smaller in acreage and more numerous than in the West. This allows the benefits to landowners from access to export markets to be shared by a larger number of individuals.

Also, the majority of funding from federal and state agencies for forestry management incentive programs goes into softwood management. Thus, the increased income

potential derived from an expanding hardwood log export market becomes an important land management incentive.

In addition, exports of lesser utilized species such as paulownia have been quite favorable to landowners with no impact on the domestic market. However, the high value hardwood forests of the North Central and Northeastern United States are limited resources that are on a much longer rotation period than softwoods.

Hardwood Chips:

The final category of basic wood resources that will be addressed is Hardwood Chip Exports. Until 1988, hardwood chip exports from the United States have primarily originated from the Pacific Northwest (PNW). Red alder is the principal species used for hardwood chips and has been considered a nuisance species in the conifer forests of the PNW where the pulp and paper industry has historically used less than 10% hardwood in their furnish, less than eastern mills.

Exports of hardwood chips from the United States began increasing significantly in 1988 when the Southern United States began shipping hardwood chips to Asia. Over 90% of the chips exported from the United States go to Japanese pulp mills.

The export trade of hardwood chips out of the U.S. South is a recent development and one that has received a great deal of discussion and debate. However, because it is a recent event, information concerning the "losers" and "winners" of such trade has not been as widely analyzed and disseminated as compared to other trade issues.

Background:

This sudden market development came as the result of a shift in the supply strategy of the Japanese pulp and paper industry. This industry is heavily dependent on foreign raw material supplies. Rising chip prices in the Pacific Northwest during the early 1980's and the potential loss of a portion of the Australian supply to a Tasmanian hardwood Kraft mill considered for 1987-88 prompted Japanese companies to secure alternative chip sources in New Zealand, Chile, China, and the U.S. South.

In 1987, small amounts of Southern U.S. hardwoods were sent to Japan. Following initial trials, almost 300,000 green metric tons were shipped in 1988 from Southern ports. In 1991, this volume approached 2 million tons and was valued in excess of \$100 million.

Hardwood chip demand in Japan is driven by pulp and paper demand, predominantly for chemical wood pulp used to make printing/writing papers and tissues. The shorter hardwood fibers when blended with softwoods enhance softness of tissues and absorbent papers.

The majority of Japanese paper production is consumed domestically. Consumption of paper and board products on a per capita basis increased dramatically during the 1980's.

During a four year period between 1985 and 1989, total consumption increased at an average rate of over 8% per year. This trend has since slowed, with an average annual increase of only 2.7% between 1989 and 1991.

In response to increasing domestic demand, the production of paper products in Japan increased over 70% between 1981 and 1991. Thus it is easy to see that one of the major benefactors of increased hardwood chip exports out of the south are Japanese pulp and paper companies.

Analysis of Winners & Losers:

Prior to 1988, the Pacific Northwest alone supplied the Japanese market with hardwood chips. In 1991, the U.S. share of the Japanese market was divided, with 44% coming from the West Coast (from Washington & Oregon); 35% from the Gulf Coast (predominantly through the export district of Mobile), and 19% from the Southeast Coast (out of the Beaufort-Moorehead City & Savannah Districts). For 1992, it appears that the Gulf Coast will equal or surpass the West Coast in hardwood chip shipments for the first time, with an estimated 1.7 million green metric tons (Figure 2).

This is made possible due to the fact that delivered costs of southern hardwood fiber have remained relatively stable over time and by the availability of an expansive land and water transportation infrastructure through the mid-south. The opening of the Tennessee-Tombigbee Waterway has greatly increased the availability of hardwoods by lowering transportation costs and significantly increasing the amount of wood that can be delivered to the Port of Mobile at a competitive price on the world market.

This has provided landowners in the South with a market for their low value hardwoods. Incomes from these lands could potentially be used for forestry management. In addition, increased harvesting activities have provided additional employment opportunities in these rural areas for those in the logging and transportation business sectors.

Other benefactors or "winners" in the export of fiber from the South include the U.S. companies selling chips to Japan. The leaders in this trade are major integrated U.S. pulp and paper companies. Their benefit is derived from the fact that profits from their overseas chip sales can be used to reduce the overall costs of raw material supplies to their domestic mills, enabling them to keep their products price competitive. While this may seem like robbing Peter to pay Paul, it must be realized that current export volumes are less than 4% of domestic hardwood fiber consumption.

The primary "losers" in the South are those industries that must compete in a local area with the export market for stumpage. Since transportation cost is the principal variable cost in the production of a low value product such as hardwood chips, the supplies with potential to export are restrained geographically in relation to distance from port. This means that the export buyer will be restricted and thus concentrated in areas

that are within reasonable transportation costs to the port. This factor is unlikely to change since fiber price is set by a world market and U.S. producers must compete with low cost emerging suppliers from Chile and Southeast Asia.

Additional concerns have been raised by the hardwood sawmill industry over increased clearcutting by chip producers which could reduce the growing stock of hardwood sawtimber in regions where there is increased production from both domestic and export chip producers. The degree to which this is actually occurring is unclear as recent forest inventory survey data in most broad geographic regions suggest that the growth of hardwood growing stock exceeds removals. This issue is currently under investigation.

There also are related environmental concerns over increases in clearcutting for fiber production. These concerns range from threatened species to wetland issues to water quality issues, and are not limited to chip production for export.

Conclusions:

To summarize, the tally sheet of "winners" and "losers", pros and cons of wood resource commodity exports is a difficult one to balance, particularly when private landowner rights are involved and impacts on domestic industry are mixed, as in the case of hardwood chip exports.

Free trade of wood resources debits include:

- (1) Reduced supplies for domestic production and potentially higher prices for timber supplies.
- (2) Reduction in timber related domestic employment and higher prices for end products.
- (3) Foregone profits from exports of value added products.
- (4) Increased environmental pressure on U.S. forest land to produce for foreign markets.

However, the credits include:

- (1) A contribution towards the balance of trade.
- (2) Increased profits to landowners which can benefit land management efforts and local economies.
- (3) Increased profits and employment by those U.S. companies involved in export trade.
- (4) Support of free trade encourages trading partners to do the same, benefiting exports of other U.S. products.

Tradeoffs between domestic and export interests are real and at times difficult to fully quantify. This makes the final accounting a topic of continuing debate.

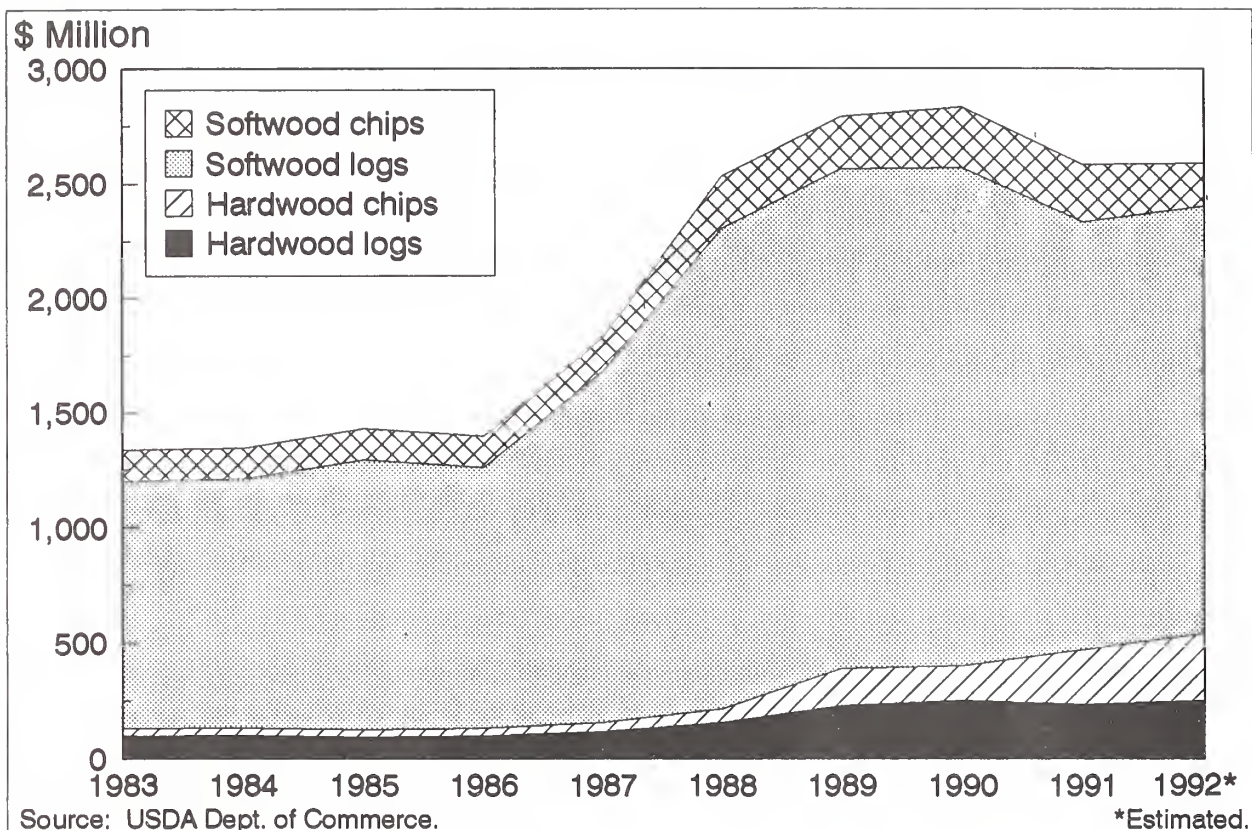


Figure 1. U.S. wood commodity exports.

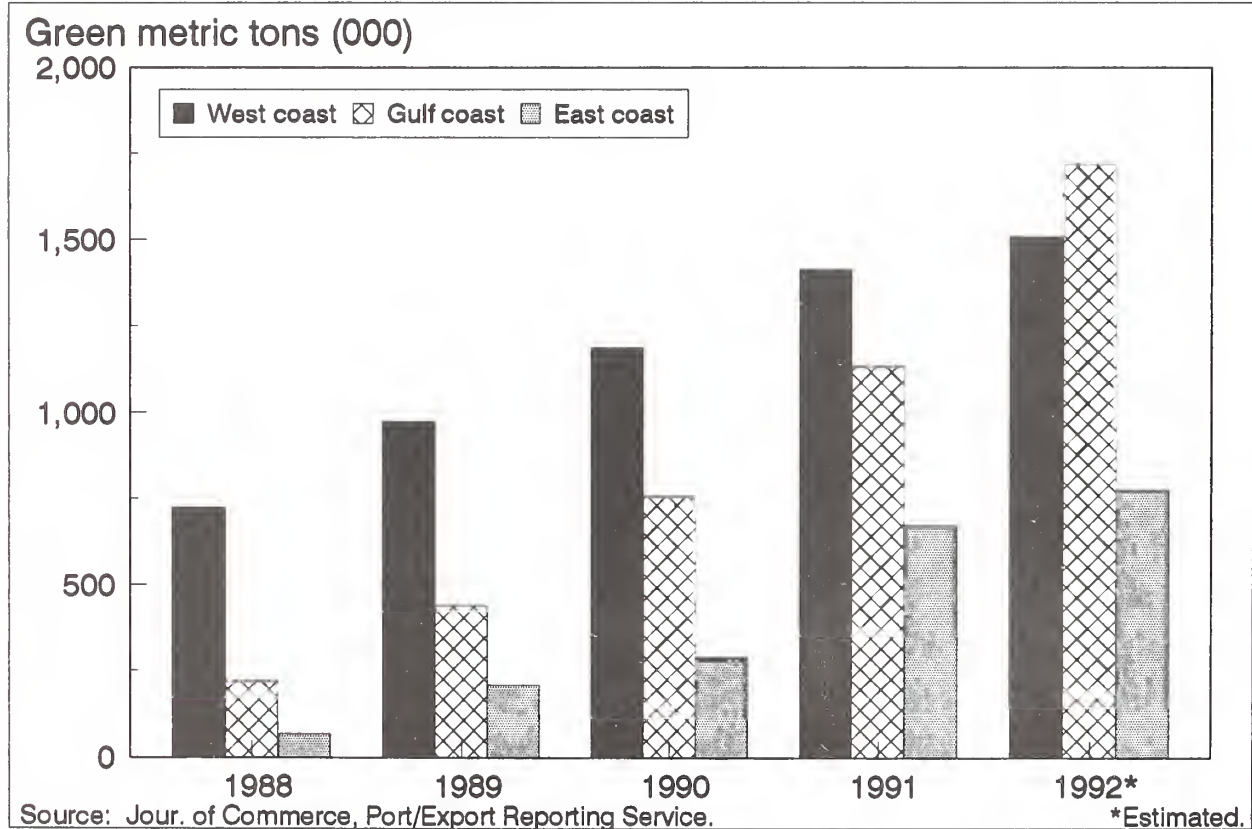


Figure 2. U.S. hardwood chip exports.

Outlook '93

For Release: Wednesday, December 2, 1992

OUTLOOK FOR FEED GRAINS**Brad Anderson and Peter Riley
Agricultural Economists****Agricultural Stabilization and Conservation Service and Economic Research Service**

The most prominent feature of the feed grain outlook is the record yields forecast for the 1992 U.S. feed grains crops. Each of the four feed grains set record yields, the first year since 1965. No doubt, yield trend lines are being reevaluated to account for this latest observation.

Another impressive aspect is the continued strong gains expected for domestic use. Domestic disappearance of corn in 1991/92 was almost 300 million bushels above the previous record set in 1987/88 and further gains are expected in 1992/93 as animal numbers continue to increase and additional corn wet milling plant capacity comes on line.

This strong performance has not been matched by the export side. Feed grain exports in 1991/92 were the lowest since 1986/87 even with strong sorghum and barley exports. Exports for 1992/93 are expected to increase only modestly, but market share will rise.

Other distinctive features include: record 1991/92 U.S. corn, barley and oats imports, as well as feed grains as a whole; the lowest sorghum carryin stocks since 1975/76; and the lowest oats planted and harvested acreage in 1992 USDA has ever reported.

As one can see, the feed grain sector has set, perhaps, a record number of records. This certainly makes forecasting a challenge as market participants have to determine whether to use these records as a basis for extrapolating future trends or discount them as aberrations. The answer is, as economists like to say, "it depends."

Key Factors For Feed Grains

This paper will focus on four factors critical to the outlook for 1992/93 and beyond: 1) corn yields, 2) feed and residual use, 3) corn food, seed and industrial (FSI) use and 4) coarse grain exports. With exception of FSI use, considerable volatility has characterized each element. As a result, these factors are somewhat difficult to forecast. Growth in FSI use has generally been steady. However, the impact of the Clean Air Act could dramatically alter the path of future FSI growth.

Each of these key factors will be discussed with particular emphasis on longer term export prospects, followed by a look at each feed grain's supply and use situation.

Yields

The 1992 corn yield is forecast at 129.3 bushels per acre, exceeding the previous record set in 1987 by nearly 10 bushels per acre. Twenty-one states are forecast with record yields including 11 of the 17 states that produced over 94 percent of the 1991/92 crop. Only three states have forecast yields at less than 90 percent of their previous record. These states (Arkansas, North Dakota and Oregon) account for less than one percent of forecast U.S. production.

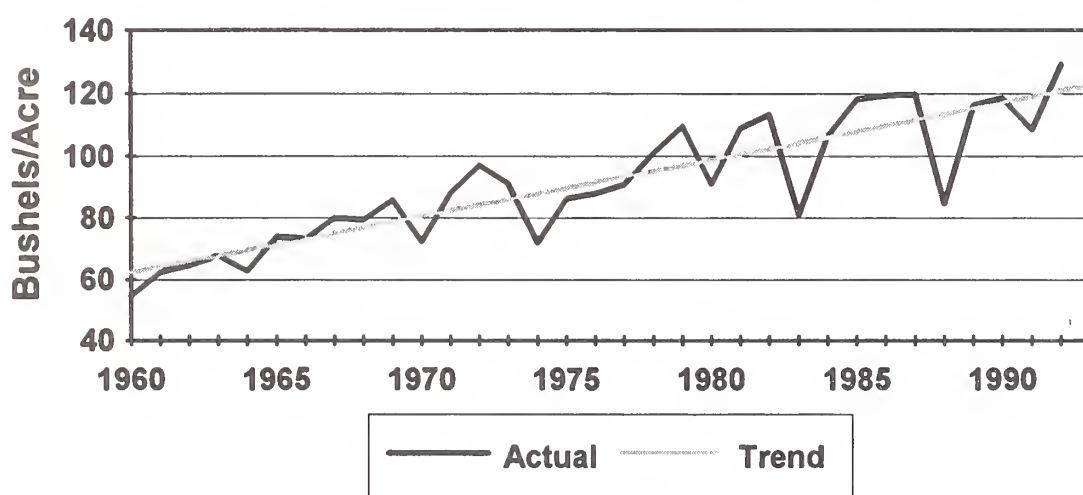
In the end, corn growing conditions were quite favorable in nearly all producing regions. However, there was concern about the corn crop throughout the year. During the winter, the possible impact of the El Nino supported new crop prices. In the spring, there was concern about delayed plantings because of wet conditions. In the early summer, it appeared it is wasn't going to rain. But the rains did come after the Fourth of July. In the early fall there was concern of frost damaging the crop in some areas. Now there is concern about increased harvest losses because of harvest delays, particularly in the northern states.

For the week ending November 15, only 58 percent of the corn crop had been harvested compared with the previous five year average of 95 percent. Thus, corn harvest is about a month behind the average.

The final size of the corn crop really won't be known until the annual crop production summary comes out in January.

Forecasting corn yields for 1993/94 generates a fair amount of controversy. A simple yield trend model based on 1960 - 1992 observations indicates a 122 bushel per acre yield for 1993 with yearly trend of 1.8 bushels per acre as shown in figure 1. Yield models that take into account crop conditions and weather show about a 1.5 bushel per acre yearly trend.

Figure 1: U.S. Corn Yields



One school of thought says corn yields are limited by nitrogen fertilization rates that have fallen from 140 pounds per acre in 1985 to 128 pounds per acre in 1991. However, others maintain that this effect is offset by improved application methods that do a better job of getting nitrogen to the plant. Another school of thought says that considerable genetic improvements have been made since the mid-80's and that favorable growing conditions allowed those improvements to be realized in 1992.

Recent talk of corn yields leveling off was also heard in the mid-70's. In 1972, corn yields reached 97.0 bushels per acre. That record stood until 1978 and 1979 when yields of 101.0 and 109.5, respectively, were posted.

It seems that the yield of 122 bushels per acre generated by the 1960-1992 trend line would be a reasonable number to plug in for 1993. For those that have to project yields beyond that, a 1.5 bushel per year increase can be justified.

The 1992 sorghum yield is forecast at 71.3 bushels per acre, eclipsing the 1987 record by almost 2 bushels per acre and the previous year's mark of 59.0. Barley and oats yields for 1992 are estimated at 62.4 and 65.6 bushels per acre, respectively. The previous record for barley was set in 1982 at 57.2 bushels per acre while the oats record had prevailed at 63.6 bushels since 1985.

Feed and Residual Use

Feed and residual use of corn was a record 4.9 billion bushels in 1991/92. However, total feed grain feed and residual use of 142 million metric tons did not surpass the record level of 147 million metric tons set in 1987/88.

The 41-million-ton rise in 1992/93 feed grain supplies will lead to lower prices, which, in turn, will promote expanding use of feed grains. In addition, larger livestock inventories and increased implied feeding rates are expected to boost demand for feed grains. Total 1992/93 feed grain feed and residual use is forecast at 152 million metric tons, up 10 million metric tons from last year, with corn accounting for three-fourths of the gain. This increase is higher than many in the industry are forecasting. But, given the livestock numbers, total feed grain supplies and prices, this figure is reasonable.

Figure 2 shows how grain consuming animal units (GCAUs) have increased since 1986/87 when feed grain loan rates were significantly reduced. GCAUs for 1992/93 are projected at 83.4 million units, an increase of 2.5 percent from the previous year, with the largest gain coming in hogs.

Animal numbers tell only part of the story. With increasing supply and lower prices, the implied amount of grain disappearance per GCAU increases. Figure 3 shows how the disappearance of feed grains and wheat per GCAU is related to the corn price received by farmers as well as regression line fit on September/August feeding years from 1979/80 through 1991/92. The point for 1992/93 is shown based on our forecast feed and residual use and prices. While this is below what prices at \$2.00 per bushel would suggest, actual feed and residual use in recent years have also been slightly below what the regression line would suggest.

Figure 2: Grain Consuming Animal Units

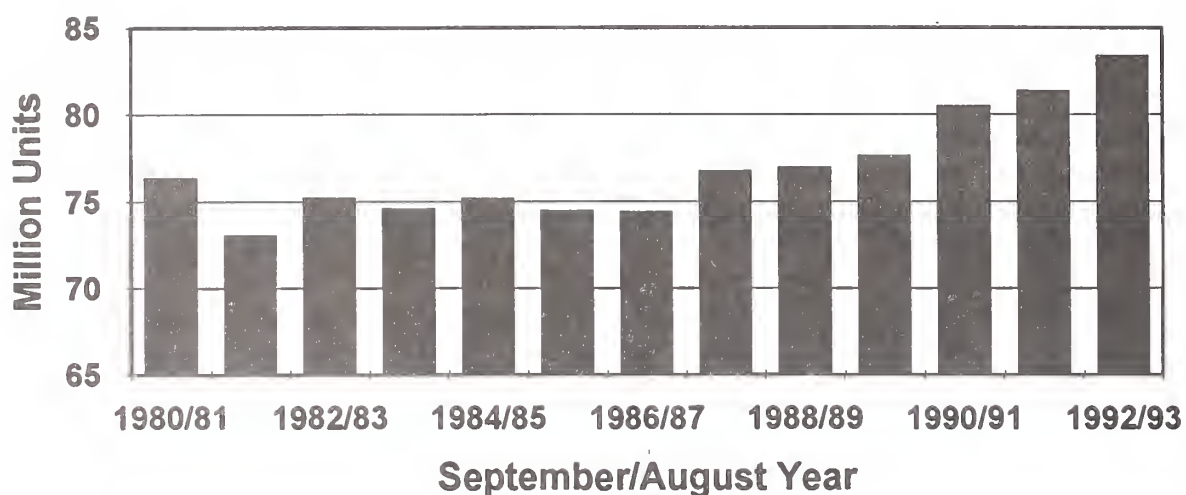
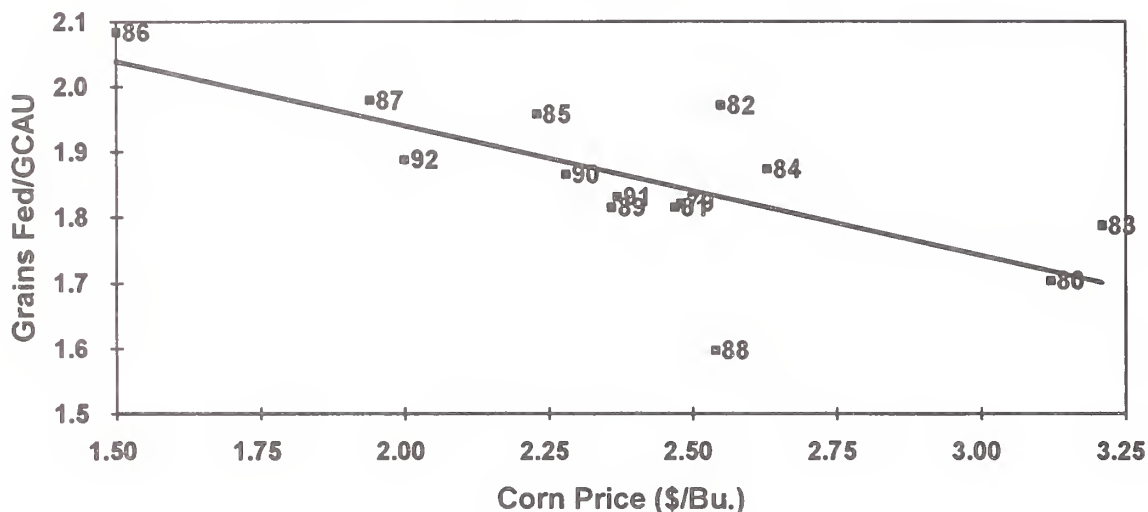


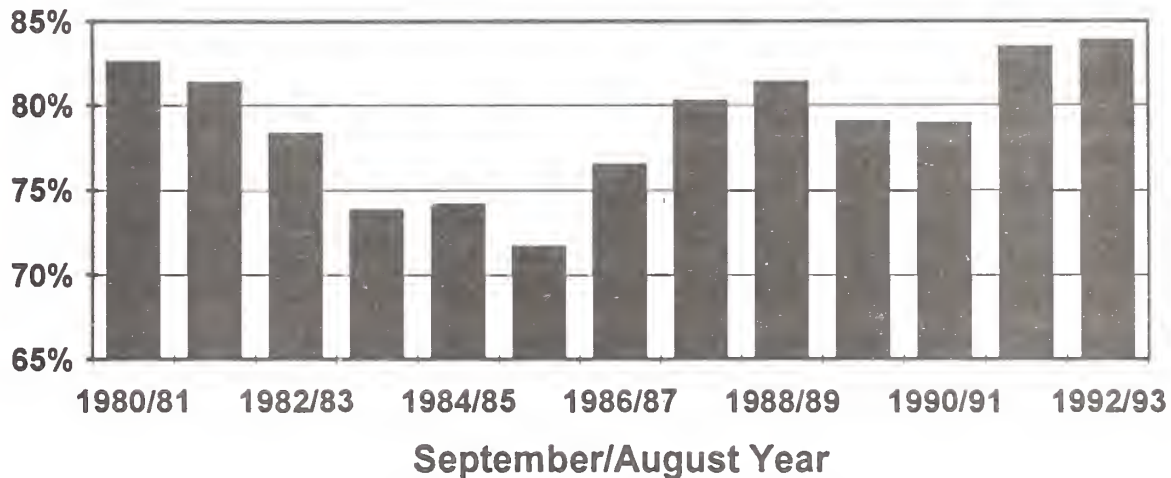
Figure 3: Grains Fed/GCAU vs. Corn Price



In 1991/92, corn accounted for 83 percent of all grains (feed grains and wheat), up dramatically from 79 percent the previous year. Tight sorghum supplies and strong sorghum exports to Mexico limited sorghum feed use. Barley, oats and wheat supplies were also fairly tight. For the September 1991-August 1992 period, the combined feed and residual use of

sorghum, barley, oats and wheat fell 7 million metric tons. Expanding corn use kept the year-to-year drop for total grains only around 1 million tons.

Figure 4: Corn Share of Total Grains Fed



The situation in 1992/93 is quite similar. Feed and residual use of total grains is expected to increase 8.4 million tons, with corn up 7.7 million. Sorghum supplies will be up sharply from last year and the feed and residual use will expand, but supplies of barley, oats and wheat will remain relatively tight.

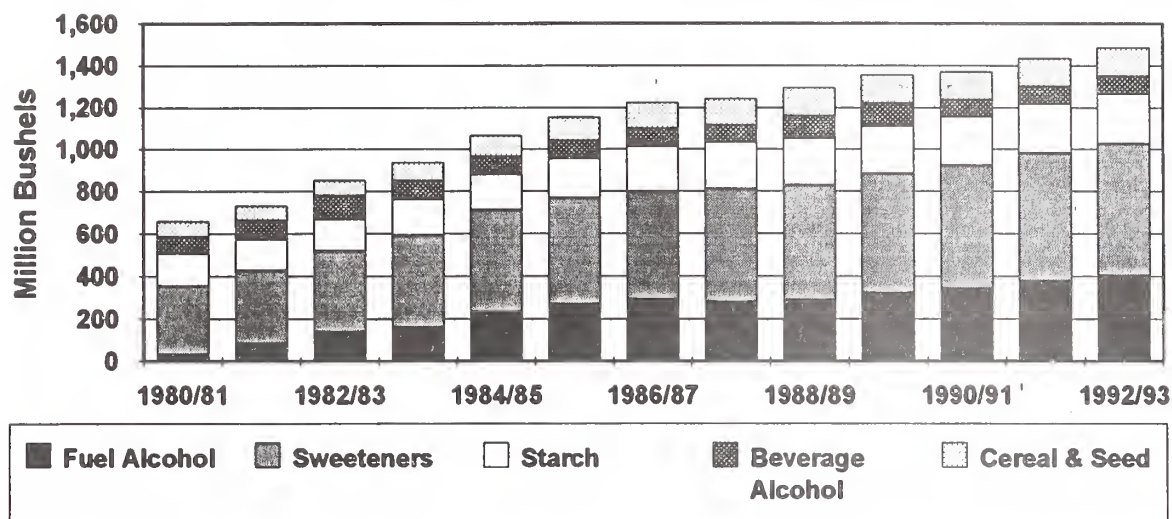
Food, Seed and Industrial Use

Corn use for FSI use has been consistently growing over time. For 1992/93, FSI use is forecast up 4 percent following a 5 percent gain in 1991/92.

Corn used to produce fuel alcohol was 378 million bushels in 1991/92, up 10 percent from the previous year. This is projected to expand to 405 million bushels in 1992/93, as additional corn refining capacity comes on line. These increases are mainly attributed to the carbon monoxide (CO) program of the Clean Air Act that went into effect on November 1, 1992.

The CO program affects 39 metropolitan areas and counties in the U.S. which failed to meet carbon monoxide air quality standards. The gasoline sold for at least the 4 winter months in these areas must contain 2.7 percent oxygen by weight. The addition of 10 percent alcohol to the gasoline gives an oxygen percent of 3.5, well above the amount necessary to meet the requirements and provides a Federal blending credit of 5.4 cents per gallon of gas. After January 1, 1993, the Federal blending credit can be prorated for 5.7 or 7.7 percent ethanol. When blended at the 7.7 percent level, the oxygen percent is 2.7.

Figure 5: Food, Seed and Industrial Use



The reformulated gasoline program of the Clean Air Act goes into effect January 1, 1995. Implementation of this program consistent with the Bush Administration's October 1, 1992 announcement, is projected to increase ethanol consumption in 1997 to 1.5 billion gallons per calendar year, up from about .9 in 1992. If all the additional ethanol is produced from corn at a conversion rate of 2.5 gallons per bushel, the use of corn in ethanol production would increase by 240 million bushels.

Exports

1992/93 Export Outlook

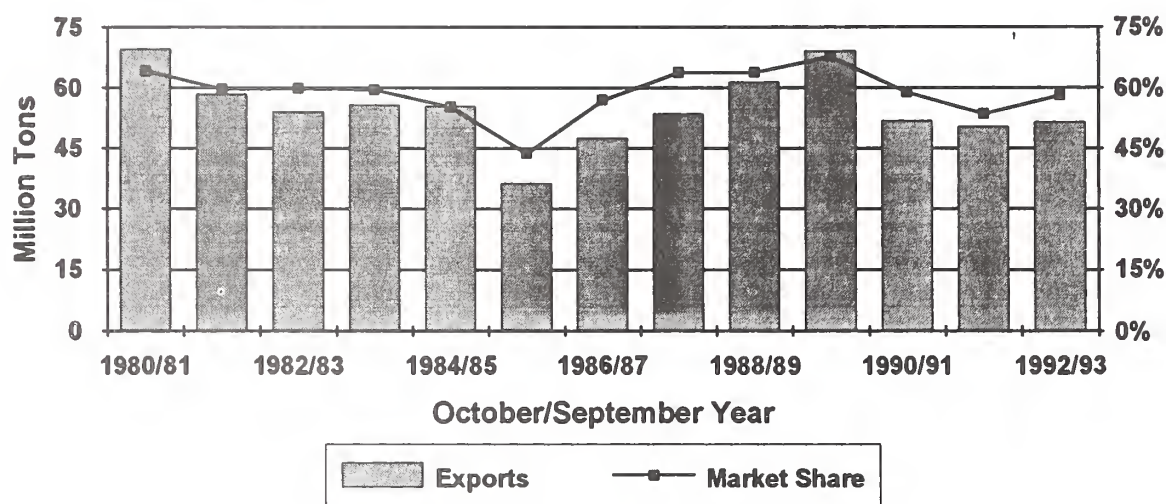
In 1992/93, U.S. coarse grain exports are forecast to increase 2 percent to 51.5 million tons. Although export prices for coarse grains will decline from levels of recent years, world trade is projected to drop 6 percent to 88.7 million tons. (October-September year) The overall market impact of lower prices will be limited by a number of other factors. Foremost is a sharp decline expected in imports by the former Soviet Union (FSU). Another major factor is an expected surge in feed wheat exports by Canada.

The FSU, which as recently as 3 years ago was the world's largest coarse grain buyer, has virtually abandoned the cash market and now relies on credit, barter, and other arrangements. Its 1992/93 imports are forecast to drop nearly 5 million tons from 1991/92, with corn, barley, and oats all expected down, due to a larger grain crop, along with continued financial problems and stagnant consumption.

The United States is expected to increase its market share from 53.5 percent in 1991/92 to 58 percent, benefiting from reduced competitor exports due to lower supplies and lower U.S.

corn prices. Fairly sizable declines in shipments are forecast for China, Eastern Europe, and South Africa, with lesser declines for Thailand and Argentina.

Figure 6: U.S. Coarse Grain Exports



China's corn exports are forecast to decline from 9.3 million tons in 1991/92 to 7.5 million in 1992/93. Exports of new crop corn from China have been off to a slow start so far this year, possibly in response to the lower international prices and tighter domestic supplies, but as usual, China's export intentions are difficult to gauge. Argentina's corn exports are forecast to stay equal to 1991/92 at 6 million tons. For South Africa, only minor exports of around 100,000 tons are foreseen, even with a recovery from drought, because of the need to rebuild stocks.

1993/94 Trade Prospects

U.S. export prospects for corn and other feed grains in 1993/94 will largely depend on weather conditions in a number of countries. While the North American Free Trade Agreement (NAFTA), the reform of the EC's Common Agricultural Policy (CAP), and the successful conclusion of the GATT will effect U.S. coarse grain trade, the major impacts will come in later years. Thus, barring any major weather problems, there is little to suggest a significant rise in world trade or U.S. exports in 1993/94.

First, no significant gains are expected in imports by the FSU. Weather problems could lead to some import increase, but its financial crisis will mean continuing reliance on credit, donations, and barter. Higher internal prices, cuts in subsidies, and falling consumer incomes are limiting the demand for meat and meat products, and livestock inventories have been shrinking.

Second, it is doubtful that Canada will be able to get rid of its large feed wheat supplies in one year, meaning feed wheat is likely to continue to depress imports of corn by South Korea and possibly others.

Third, under normal weather conditions, some loss of import demand for corn appears certain in southern Africa. South Africa and other countries in the region were ravaged by drought last year, slashing production of corn, the region's staple food. Combined corn imports climbed from about 500,000 tons to more than 5 million in 1991/92--with the U.S. supplying the major portion--and imports are forecast at only slightly smaller levels for the 1992/93 October-September trade year. However, in 1993/94, with average harvests, corn imports will fall back dramatically.

Despite this fairly gloomy assessment for world imports, the U.S. is well positioned to gain market share. This year's lower prices will provide little incentive to competitors to expand production or exports in 1993/94. In addition, there is potential for a reduction in exports by the EC because of reform of the Common Agricultural Policy.

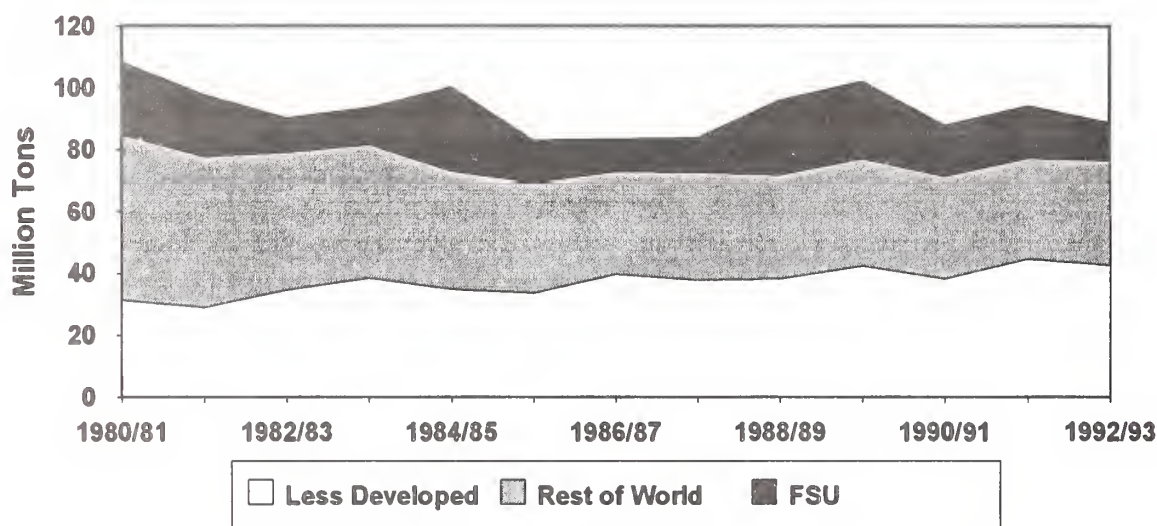
Outlook Beyond 1993/94

The U.S. is likely to realize export gains as a result of rising import demand combined with little growth or even declines in overall competitor exports. The size of the increase will hinge on developments in the GATT and among many key players, especially in the FSU, East Asia, the EC, China and Argentina.

Import Demand

Changes in the pattern of world import demand will continue to reshape the direction of U.S. exports in the 1990's. During the 1980's, exports to Europe consistently declined but this development was partly offset by gains in sales to Asia. Exports to the Soviet Union displayed large annual variations, but were high on average.

Figure 7: World Coarse Grain Imports



In the near-term, there appears to be little chance for the FSU to rebound as a huge importer. Growth in world imports will be increasingly fueled by less developed countries. While population growth will generate increased demand, it will take improved income growth to translate this demand into expanding imports.

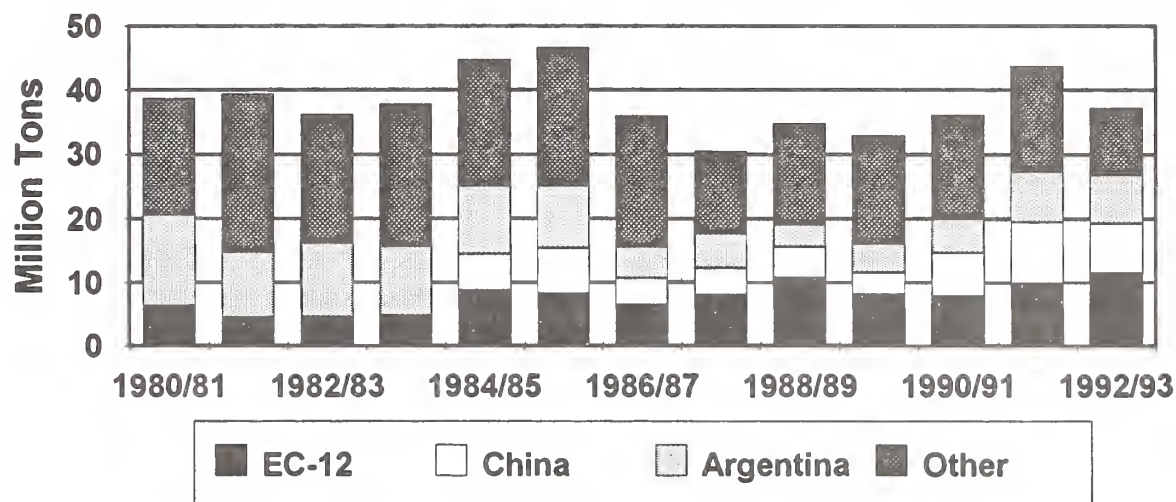
Where incomes have been growing, as in the newly industrializing countries of Asia such as Taiwan and South Korea, there has been tremendous growth in feed grain demand. Changes in meat trade will also influence feed grain demand in these and other Asian markets. In Japan, market liberalization has brought significant increases in meat imports, slightly reducing Japan's feed grain imports. Nevertheless, the U.S. still benefits: higher U.S. beef exports to Japan; gains in corn exports to Taiwan which exports pork to Japan; and reduced competition from Thailand's corn exports as it uses more corn domestically and increases poultry exports to Japan.

Export Competition

Likewise, changes in export competition are also likely. During the 1980's, for example, Argentina's corn and sorghum grain exports fell considerably as a result of lower feed grain prices in the mid-1980's and continued shifts into oilseeds. South Africa began to reduce corn plantings in the late 1980's in an attempt to reduce exports because of increased cost of subsidies. Conversely, China emerged as a major corn exporter at the end of the decade, as its production increased. The EC also developed into a major exporter, primarily of barley, during the decade. Continuing declines in EC use led to expanding surpluses and export subsidies to move the surplus into world markets.

Prospects for U.S. exports in the mid-1990's will be largely shaped by future developments among 3 major foreign exporters, the EC, China, and Argentina.

Figure 8: Competitor Coarse Grain Exports



Changes in EC Policies

The EC's volume of coarse grain exports could decline in the next few years as a result of CAP reforms. The EC has embarked on significant reforms to its agricultural policy regime to be phased in over a 3 year period starting with 1993/94 crops. Among key provisions are a set-aside program for larger grain farms, reductions in intervention prices for grain of about 30 percent, with the largest drop in 1993/94, and steep reductions in oilseed support prices. Farmers who set aside required amounts of land will receive compensation for price reductions through direct payments.

Obviously, uncertainty surrounds the impact of these policy shifts. However, many analysts suggest that EC farmers will favor wheat over barley because of wheat's relatively high yields. At the same time, increases in EC feed and industrial use of coarse grains are likely in response to lower prices.

The magnitude of these adjustments is very hard to predict, with a multitude of issues affecting the final outcome. How much, if any, will the long-term growth in EC grain yields slow down? How much will EC meat production and consumption expand in response to lower feed costs? How well will the CAP reform fit with a GATT agreement? Answers to these questions and numerous more will become more clear in the months and years ahead.

China's Status as a Corn Exporter

China's emergence as the leading foreign exporter of corn in recent years was a surprise to many analysts. Many of the fundamental attributes of the country raise questions about its ability to export more than 9 million tons of corn, as it did in 1991/92. These include a huge and growing population, a limited land base and competition for farmland for industry and other crops, and sharp increases in economic growth and demand for meat.

Our understanding is still limited, but it is clear that China has been able to produce enormous surpluses of corn. Policies evidently provided strong incentives to increase corn production. Most of this surplus has developed in the northeast of the country where demand is relatively low, while a limited internal transportation system and high costs have inhibited distribution to corn deficit areas to the south. However, there have not been signs of severe feed shortages in the country, suggesting other feeds are available. One of these alternative feeds is apparently low quality rice, produced in abundance, but facing increasingly limited acceptance for food as incomes rise.

In recent months, China has begun to shift toward a more market oriented agricultural sector that could change production and consumption patterns, in turn affecting the amount of corn exported. Low levels of meat consumption and prospects for rapid income growth still suggest big increases in corn feeding. Higher domestic demand, the potential for internal market prices to surpass export prices, and reductions in the availability of alternative feeds may eventually reduce China's corn surplus.

Argentina's Untapped Potential

Argentina remains a country with the greatest export potential of any competitor. It has abundant and fertile land, and relatively low costs of production. However, during the 1980's, Argentina's status as the world's second largest coarse grain exporter eroded. Unfavorable government policies, the inability to compete at lower prices, and large shifts into more profitable oilseeds led to reduced corn and sorghum production and exports. However, there are signs of progress in Argentina because of the current government's commitment to privatization and reduced government interference. Over the long run, privatization could sharply lower Argentina's high marketing and transportation costs, enhancing its competitiveness and improving returns to farmers.

Corn Supply and Demand Situation

As table 1 illustrates, 1991/92 was a year of stocks tightening due to yields that were about 10 bushels per acre below trend. Total use increased 154 million bushels over 1990/91 because of strong domestic demand. Imports were unusually high because of imports from Canada.

Table 1: Corn Supply and Use

Item	1990/91	1991/92 Estimate	1992/93 Projected
	-- million acres --		
Planted Acreage	74.2	76.0	79.3
Harvested Acreage	67.0	68.8	72.1
	-- bushels per acre --		
Yield	118.5	108.6	129.3
	-- million bushels --		
Beginning Stocks	1,344	1,521	1,100
Production	7,934	7,474	9,329
Total Supply	9,282	9,015	10,439
Feed & Residual	4,669	4,897	5,200
Food, Seed & Industrial	1,367	1,434	1,485
Domestic Use	6,036	6,331	6,685
Exports	1,725	1,584	1,600
Total Use	7,761	7,915	8,285
Ending Stocks	1,521	1,100	2,154
	-- dollars per bushel --		
Average Farm Price	2.28	2.37	1.85 - 2.15

Ending stocks are projected to nearly double in 1992/93. Production is forecast at 9.3 billion bushels, up 25 percent from a year earlier. Use is expected to increase 370 million with feed and residual use accounting for most of the increase. Prices are expected to fall to a range of \$1.85-2.15 per bushel.

Exports have gotten off to a very strong start this year, but the pace is expected to slow later in the year and shipments are forecast up just 1 percent to 1.6 billion bushels. U.S. export sales and shipments through November 12 are up a third from a year earlier. This reflects a stronger pace of sales to a variety of markets, including southern Africa, Taiwan, Egypt, and many Middle Eastern and Latin American countries. However, this pace will not be sustained because sales to southern Africa, accounting for the biggest share of the increase, are likely to shrink later in the year.

Exports to the former Soviet Union will go primarily to Russia, mostly under credit guarantees in the GSM-102 program. The Ukraine is also importing under GSM-102. Smaller amounts are moving as food aid donations to Russia, the Baltic states, Belarus, and Moldova. More donations are planned, with 1 million tons announced in late October that has not yet been allocated by former republic or State.

Japan will continue as the largest U.S. market in 1992/93 with some gains in market share due to the absence of exports from South Africa. Prospects for sales from China, Japan's second largest supplier in 1991/92, are less certain. Taiwan will continue as one of the top U.S. markets in 1992/93. Except for small purchases from Argentina, Taiwan's imports all came from the U.S. in 1991/92. In South Korea, U.S. corn will continue to face sharp competition from China as well as from feed wheat from Canada.

Imports by Mexico, a market dominated by the U.S., are forecast to increase modestly in 1992/93, but remain well below sorghum imports. Sorghum is the major feed grain in Mexico, and the major imported grain in the last 2 years. Corn imports still require a license, and there are restrictions on feed use. The NAFTA, if ratified by Congress, will not take effect until January 1994 and has no direct bearing on 1992/93 imports.

Prospects for 1993/94 obviously involve large carryin stocks and lower production. Planted acreage will fall because of an increase in the acreage reduction program (ARP) from 5 percent in 1992 to 10 percent in 1993. Acreage in the ARP will at least double from the 3.1 million acres set aside in 1992. Because the corn price that farmers will likely see at planting time will be 25-30 cents per bushel lower than a year earlier, planted acreage will also likely be reduced by increased enrollment in 0/92, more acreage "flexed" to soybeans and more idled normal flex acres. In addition, lower prices will also probably reduce acreage planted outside the program.

The corn yield will likely be lower in 1993 as growing conditions are unlikely to be as favorable as this year, but unless corn yields are significantly below trend, supplies will be sufficient to meet expanding demand. Barring a sharp rise in prices, feed and residual use will continue to expand and FSI use will increase as additional wet milling capacity is added in response to the Clean Air Act.

Sorghum Supply and Use Situation

A substantial increase in production in 1992 allowed supply to recover despite record low beginning stocks. Sorghum picked up more than 1 million acres in 1992 when failed cotton acreage in Texas was replanted to sorghum. The return of this acreage to cotton will drop 1993 sorghum plantings since the 1993 ARP is unchanged from 1992. Thus, despite larger carryin stocks, 1993/94 supplies will likely drop from this year's level.

Exports for 1992/93 are forecast up 3 percent to 300 million bushels, based on expectations of large sales to Mexico, continuing the strong pace of 1991/92. Feed and residual use in 1993 will be depend on export prospects.

Table 2: Sorghum Supply and Use

Item	1990/91	1991/92 Estimate	1992/93 Projected
	-- million acres --		
Planted Acreage	10.5	11.0	13.5
Harvested Acreage	9.1	9.8	12.3
	-- bushels per acre --		
Yield	63.1	59.0	71.2
	-- million bushels --		
Beginning Stocks	220	143	53
Production	573	579	878
Total Supply	793	722	931
Feed & Residual	410	368	500
Food, Seed & Industrial	9	9	10
Domestic Use	419	377	510
Exports	232	291	300
Total Use	651	669	810
Ending Stocks	143	53	121
	-- dollars per bushel --		
Average Farm Price	2.12	2.25	1.75-2.05

Barley Supply and Demand Situation

Tight carryin stocks and smaller 1992 harvested acreage is expected to keep stocks levels near record low levels. Barley probably lost substantial flex acreage to wheat in 1993. Net return comparisons indicate that barley is only slightly better positioned to compete for acreage next year. Although the 0 percent ARP for 1993 will provide a small increase in acres available for 1993, no build up of barley supplies is foreseen for 1993/94.

Exports for 1992/93 are projected to rise 16 percent to 110 million bushels, reflecting tighter competitor supplies and large Export Enhancement Program initiatives. If exports prospects continue strong into 1993/94, ending stocks as well as feed and residual use will likely continue to decline.

Table 3: Barley Supply and Use

Item	1990/91	1991/92 Estimate	1992/93 Projected
		-- million acres --	
Planted Acreage	8.2	8.9	7.8
Harvested Acreage	7.5	8.4	7.3
		-- bushels per acre --	
Yield	56.1	55.2	62.4
		-- million bushels --	
Beginning Stocks	161	135	129
Production	422	464	456
Imports	13	25	20
Total Supply	596	624	605
Feed & Residual	205	230	195
Food, Seed & Industrial	176	171	170
Domestic Use	380	401	365
Exports	81	95	110
Total Use	461	496	475
Ending Stocks	135	129	130
		-- dollars per bushel --	
Average Farm Price	2.14	2.10	2.00-2.20

Oats Supply and Demand Situation

Like barley, despite record yields, 1992/93 oat supplies are expected to be down 1992/93. Oat imports are projected to drop dramatically because of sharply reduced exportable supplies from Scandinavia. Oat acreage and supplies will likely fall in 1993 unless prices substantially increase next spring.

Table 4: Oats Supply and Use

Item	1990/91	1991/92 Estimated	1992/93 Projected
	-- million acres --		
Planted Acreage	10.4	8.7	8.0
Harvested Acreage	5.9	4.8	4.5
	-- bushels per acre --		
Yield	60.1	50.7	65.6
	-- million bushels --		
Beginning Stocks	157	171	128
Production	358	243	295
Imports	63	75	40
Total Supply	578	489	462
Feed & Residual	286	235	230
Food, Seed & Industrial	120	125	130
Domestic Use	406	360	360
Exports	1	2	2
Total Use	407	362	362
Ending Stocks	171	128	100
	-- dollars per bushel --		
Average Farm Price	1.14	1.20	1.25-1.35

Outlook '93

For Release: Wednesday, December 2, 1992

TRADING IN A NEW ENVIRONMENT

James D. Sullivan
Vice President Commercial Consulting
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Introduction:

It is indeed a pleasure to participate in USDA's 69th Annual Outlook Conference and take part in this panel. When asked to be a member of the panel and given the titled "Trading In A New Environment", my response was what do I talk about. I was told use your imagination.

I recall a marketing professor of mine lecturing about the four areas of decision-making, known as the TODD school of management. TODD stands for Think, Observe, Decide, and Do. In the time allotted, my job is to help you think about some market factors and make some observations about them. The deciding and doing will be up to you as market participants. (Fig. 1)

Corn and Feed Grain Fundamentals:

The USDA has confirmed a record large corn crop this year (9.3 billion bushels), nearly 25% higher than a year ago and the first 9-plus billion bushel crop. (Fig. 2) I can't argue about the supply figures, i.e., total supplies 16% above a year ago and the fifth largest. However, the demand side has got to prove itself. Total use as well as domestic demand are projected at record levels. Total usage of 8.28 billion bushels is 5% higher than last year and 2% above the previous record. The record level of total usage is due primarily to the record level of domestic use (6.68 billion bushels) resulting from a 6% increase in feed demand, which is also at record levels. Although exports are projected to increase 1%, they will still be significantly below (33%) the 1979-80 record level of 2.4 billion bushels. Because of the nearly 13% surplus of corn relative to total demand, ending stocks will increase over 1 billion bushels. On the surface, these are bearish numbers. However, the record demand pace should prevent the corn market from collapsing this year. On the other hand, it is my opinion that there just doesn't seem to be enough bullish or bearish forces to move this market strongly in either direction.

In the longer time frame, looking at the 1993 crop, the numbers would suggest a market probably not much different from the current marketing year. Next year, with the 10% ARP, planted acreage could decline 4 to 5 million acres. Assuming average yields decline from this year's record to 125 bushels, corn production could decline nearly 1.0 billion bushels leaving total estimated supplies unchanged to slightly higher (1%). It is very unlikely that domestic feed demand will continue at its record pace and exports probably will not offset any decline in domestic demand. This would suggest that 1993-94 corn ending stocks could increase 100-150 million bushels. This implies that some unknown factor (weather) must come into the picture

between now and next July, suggesting December 1993 corn futures should be contained within the \$2.30 to \$2.70 price range. If next year's fundamentals are realized as outlined, look for harvest lows in the \$2.00 to \$2.10 range, basis December 1993 futures.

U.S. Corn Exports:

U.S. agricultural trade developments of recent years, while favorable, have produced mixed results. Perhaps one of the biggest trade disappointments was the continued weakness that pulled U.S. corn exports during the past marketing year to the third lowest level for any year since the mid-70's. Overall, the positive trade developments of the past year far outweighed the negative. This is evident in the USDA's latest projections which suggest U.S. agricultural exports, in both value and tonnage terms increased about a tenth. Most agricultural commodity exports, except corn, cotton and tobacco, registered export gains last year. During the past marketing year, corn exports declined for the second consecutive year, falling 8% below the previous year and 33% below the 1979-80 record level. Currently, the USDA is projecting a 1% increase in corn exports for the 1992-93 marketing year. (Fig. 3)

Over the past 10 years, the top five importing countries of U.S. corn have remained the same, i.e. the EC, FSU, Japan, Mexico, and Taiwan. During the 5-year marketing period 1982-83 through 1986-87, Japan accounted for 28.2% of U.S. corn exports, FSU — 17.1%, EC — 13.8%, Taiwan — 6.8% and Mexico — 6.0%. (Fig. 4) But, during the most recent 5-year period Mexico and the EC have switched positions. Mexico is now the fourth largest importer of U.S. corn accounting for 6.8% of exports while the EC accounted for only 5.3% of U.S. corn exports. (Fig. 5)

The North American Free Trade Agreement (NAFTA) if approved and lives up to its potential would be a significant development having a long term impact upon grain trading. Most of the agricultural trade provisions in NAFTA are provided in separate bilateral agreements between the U.S. and Mexico and between Mexico and Canada. The pact eliminates 50% of the tariffs on U.S. - Mexico trade immediately and all of them within 15 years. The U.S. is already the major exporter of coarse grains to Mexico. In the late 1980's, about 80% of Mexico's corn imports and 90% of its sorghum imports originated in the U.S. Mexico is the third largest trading partner with the U.S. after Canada and Japan. The agreement liberalizes trading opportunities to a Mexican market with more than 92 million consumers and a population growing more than 2 percent annually. Because NAFTA reduces all tariffs, quotas, and licenses that act as barriers to agricultural trade between the United States and Mexico, it helps to assure the growth in U.S. grain and oilseeds exports to Mexico. Virtually all analyses have shown that NAFTA will result in a larger market share for U.S. grain exports to Mexico. Of the grains, corn is expected to reap the greatest growth in trade. For corn, NAFTA immediately permits duty-free imports of 2.5 million metric tons (98 million bushels) of U.S. corn. In subsequent years, the duty-free quota would increase 3% compounded annually over a 15-year period. Mexico's imports of U.S. corn during the past 10 years have ranged from a low of 915,000 metric tons in 1991-92 to a high of 4.85 million tons in 1989-90. Taking NAFTA at face value suggests a gain of 1.52 million tons (60 million bushels) in export business during the first year. Mexico's 215% tariff equivalent on U.S. corn imports that exceed the duty-free quantity would be phased out over 15 years. A 24% reduction in the tariff equivalent would occur during the first six years (4% per year), with remaining tariff reduced by approximately 8.44% per year over the final 9 years. As the tariffs

are reduced and the demand for feed grains grows, U.S. corn exports to Mexico will increase steadily over the long term. The USDA projects that by the end of the 15-year transition period, corn export to Mexico should approximate 6 million tons (236 million bushels) annually. (Fig. 6)

Changes in U.S. Futures Industry:

Changes in U.S. futures trading over the last 10 years show up clearly in this slide as the futures industry moved away from agriculture's dominance to financial products. The period can be divided into the segments pre-1985 and post-1985. During the early 1980's, agricultural contracts represented over 50% of U.S. futures industry's trading volume. (Fig. 7) Also, the Chicago Board of Trade (CBOT) and the Chicago Mercantile Exchange (CME) combined represented 75% of the volume traded on all U.S. exchanges. In 1982, things began to change with the introduction of stock index futures, options and other derivative products. Financial futures, options, and stock index contracts attracted new customers to the industry. The term "commercial" was no longer a grain exporter, farmer Co-op, or regional elevator. Now, the commercial or institutional segment of the market includes traders for banks, insurance companies, pension funds as well as grain firms. Many corporations with risks associated to price, interest rate, or foreign exchange rate have turned to the futures or options markets to develop strategies of risk management.

The post-1985 period has seen a rapidly changing structure with the growth in the number of exchanges, but a decline in the number of brokerage firms. As the industry became more global and the number of exchanges increased, an expanded foreign customer base evolved. Both the exchanges and brokerage firms had one goal, i.e. increase market share. This resulted in expanded trading hours and negotiated commission rates. The CBOT was the first U.S. exchange to offer an evening trading session in the spring of 1987. As the brokerage firms' customer base became more institutional, it required brokers to deliver new levels of service but at reduced rates. At the same time, as large financial institutions moved into the futures and options risk aversion, they decided to do their own trading and became members of exchanges.

As the number of financial and currency products increased, the agricultural contracts share of the industry's trading volume declined to less than 20%. However, the trading volume in agricultural contracts seemingly has stabilized between 20% and 25% of total CBOT volume. (Figure 8) Surprisingly, corn was the tenth most active futures contracted traded in the world during 1991 with U.S. T-Bonds being first and the Eurodollar second. This compares to corn being the sixth most active U.S. futures contract in 1991 with nearly 11 million contracts traded (soybeans had 9 million contracts traded). Ten years earlier, the corn contract was ranked second with 10.7 million contracts traded just nosing out soybean with 10.5 million in terms of total U.S. futures volume.

Since 1980, the corn contracts have represented between 16% and just over 21% of CBOT agricultural contracts volume. By comparison, soybeans have ranged from 16% to 23.6% of CBOT's agricultural volume. (Figs. 9 & 10)

Like financial futures, agricultural options have experienced phenomenal growth since 1985. The volume of all agricultural options trading on the CBOT has rose over 4 times. Soybean and corn options rank sixth and seventh in the top 10 U.S. options on futures traded in 1991. (Fig. 11)

Factors to Consider:

As a wrap-up, I would like to mention some developments in U.S. and world grain markets which will influence the markets in the 1990's. The developments will evolve over time and are not expected to have a dramatic short-term impact.

The 1990's will probably be remembered as the era of automated trading and globalization. Computers and technology advances have enhanced almost every aspect of the futures industry from trading systems and technical analysis programs to analyze the markets, to the flow of news and quotes, to the handling and executing of orders. After five years to develop and \$70 million, GLOBEX the after-hours electronic trading system was launched this summer. This global futures and options trading system was developed by the CBOT, CME and Reuters Holding. If the after-hours trading system doesn't make the world smaller, it certainly should expand the traders' universe.

Non-U.S. exchanges now account for nearly half of the world's futures and options volume. The CBOT and CME continue to be the two largest exchanges accounting for 40% of the global market volume. New York Mercantile Exchange (NYMEX) formerly the third largest exchange by volume was replaced this year by the London International Financial Futures Exchange (LIFFE). World trading growth is likely to continue as new markets emerge in the Pacific Rim and Latin American. The flow of futures and options business to off-shore exchanges can be attributed to a number of factors but two major ones: 1) establishment of international exchanges has made it possible for some international market participants to do business locally; and 2) off-shore exchanges offer advantageous speculative position limits. The aggregate trading volume on U.S. exchanges fell nearly 5% from 1990 levels in 1991 while the number of contracts traded on international exchanges actually increased 5.5%. In 1991, the percentage of futures and options contracts traded on non-U.S. exchanges expanded to 47% of world-wide total compared to only 41% in 1990.

Finally, there is some good news out there. The GATT and NAFTA agreements should help bring some discipline to the chaotic international grain market. Longer term, U.S. exports of corn and feed grains will continue to be the key to expanding consumption (use). We all know of the direct relationship between corn prices and exports and the inverse relationship between corn prices and ending stocks. Expanding domestic use by emphasizing alternative use such as ethanol production will not replace the importance of the world export market to U.S. corn producers. Where the GATT and NAFTA approval process ends up is anyone's guess at this point, but there is no doubt they are of key importance to expanding the export base.

NAFTA will open a free-trade zone from Mexico to Canada. U.S. agricultural exports to Canada and Mexico are worth about \$7 billion, equaling our sales to the EC. When North America's trade channels are free, the long-term strategy includes broader ties with Central and South America. Mexico's economic recovery, based on aggressive privatization and reversal of socialist policies, points to rapidly rising food demand. It is estimated, by the mid-1990's, the Mexican economy could be growing at about 5% to 6%, twice the pace of the U.S. Economy.

Figure 1

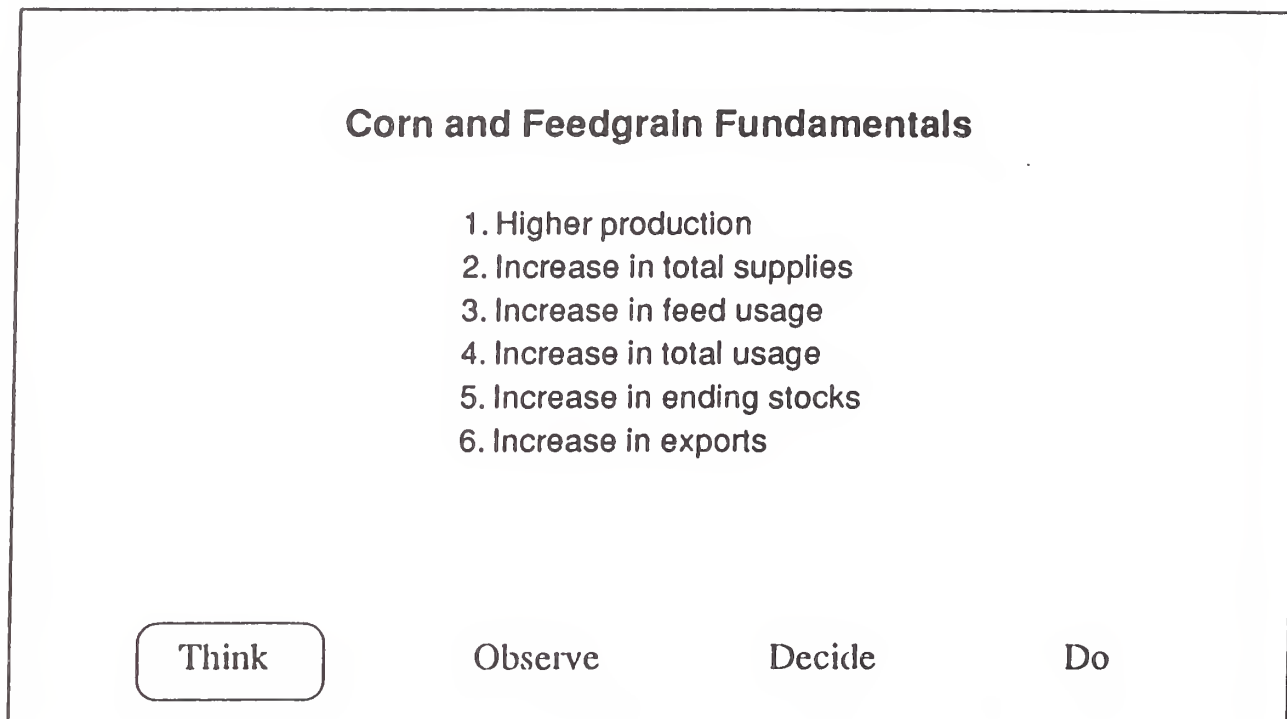


Figure 2

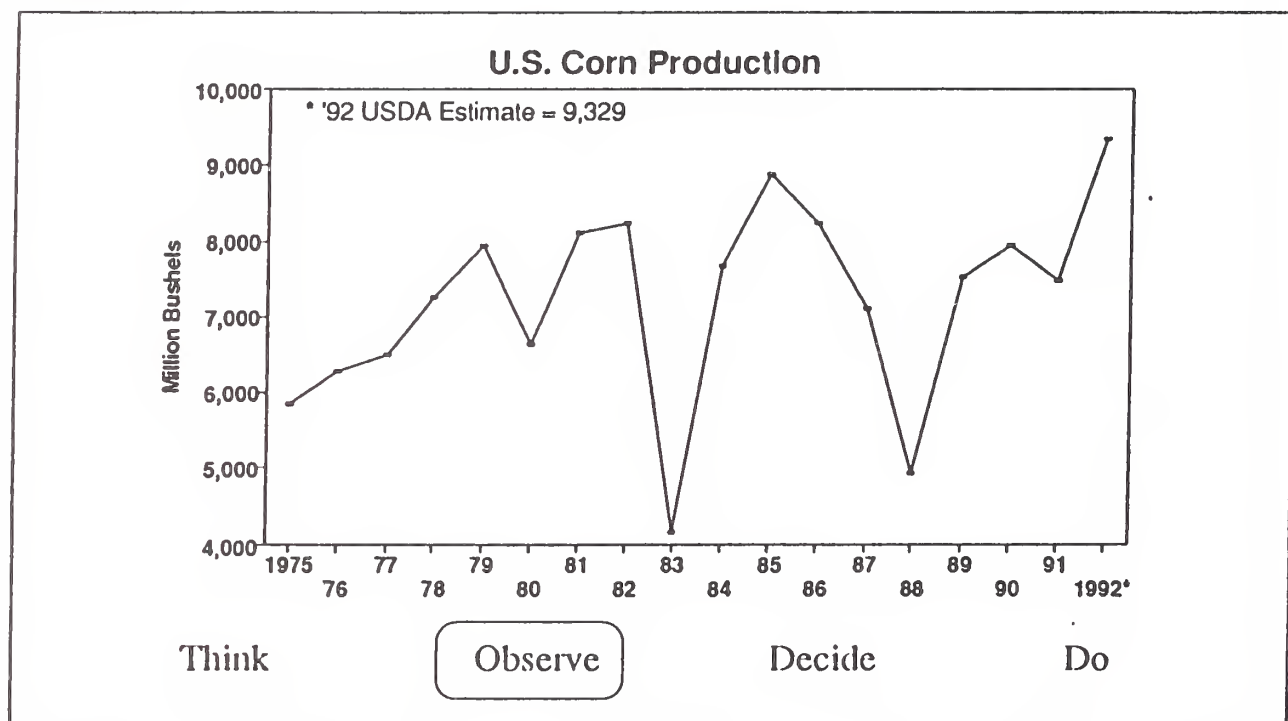


Figure 3

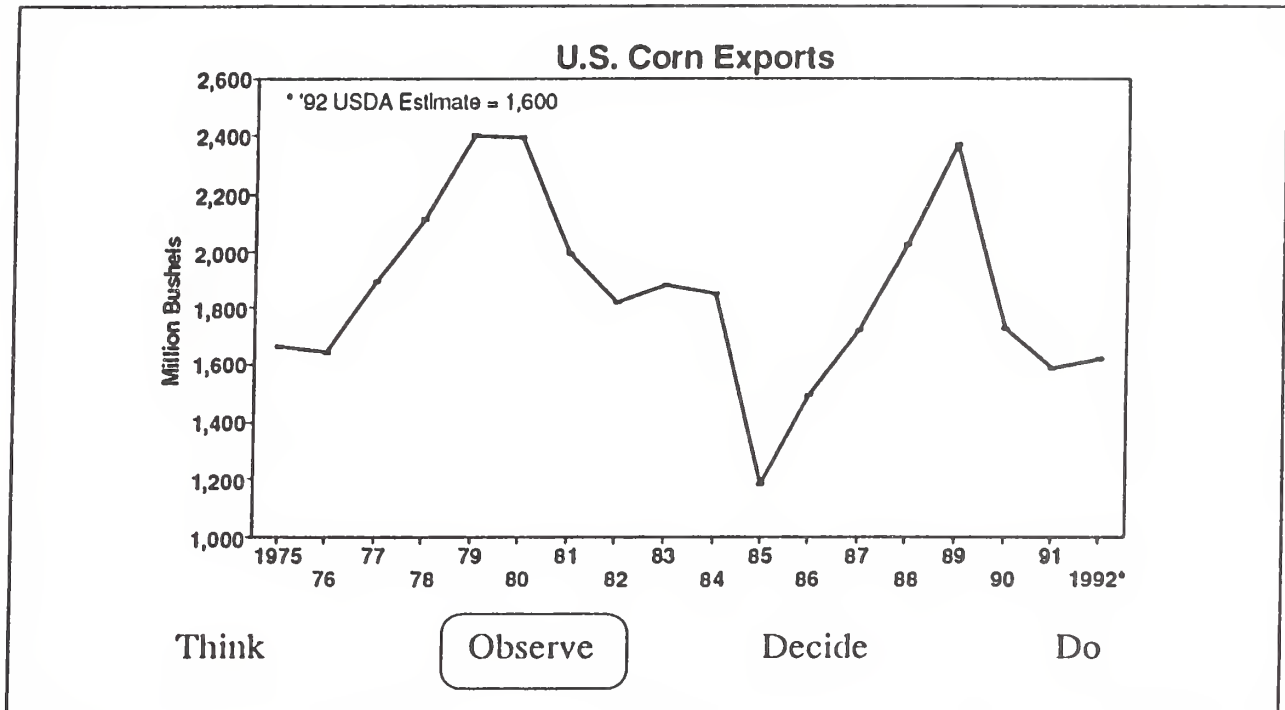


Figure 4

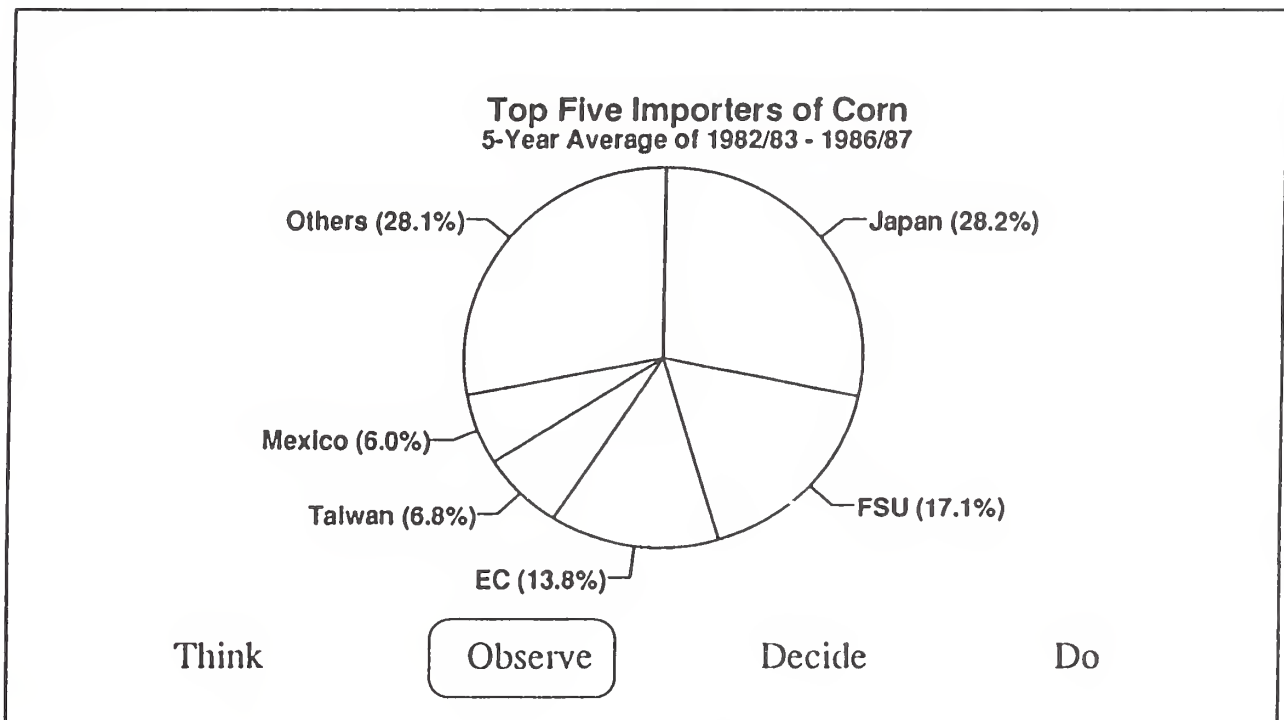


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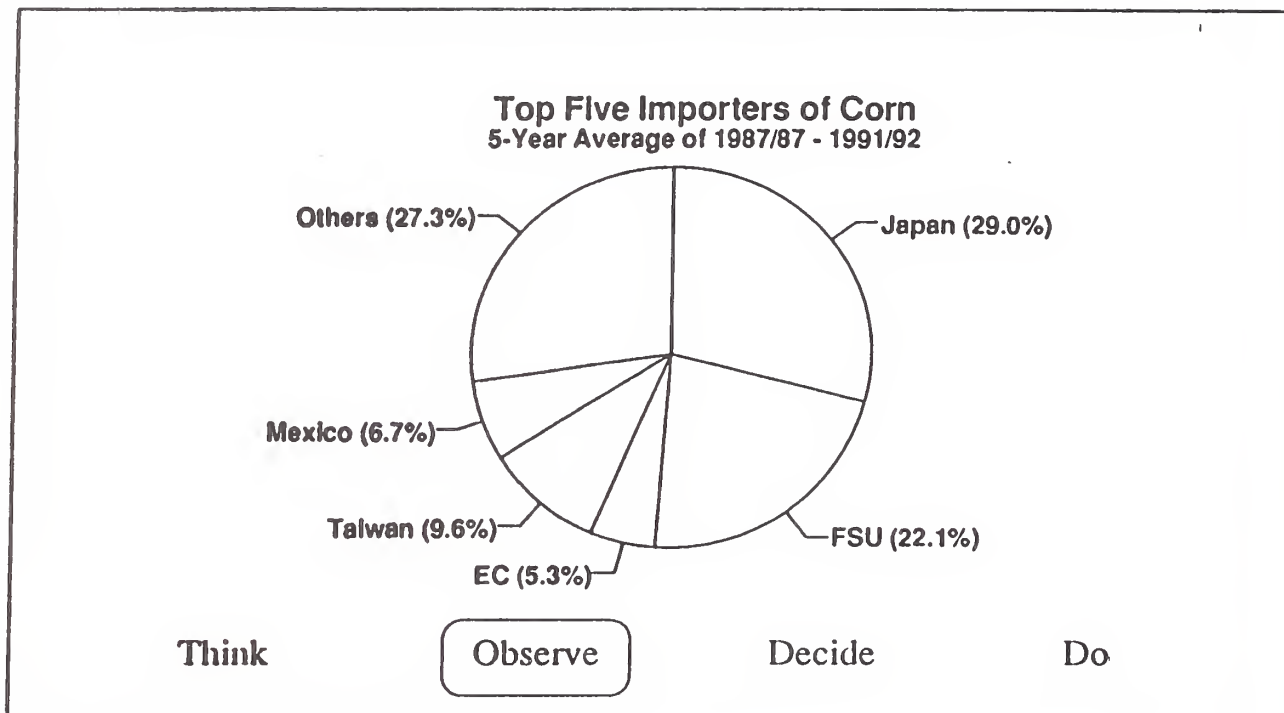


Figure 6

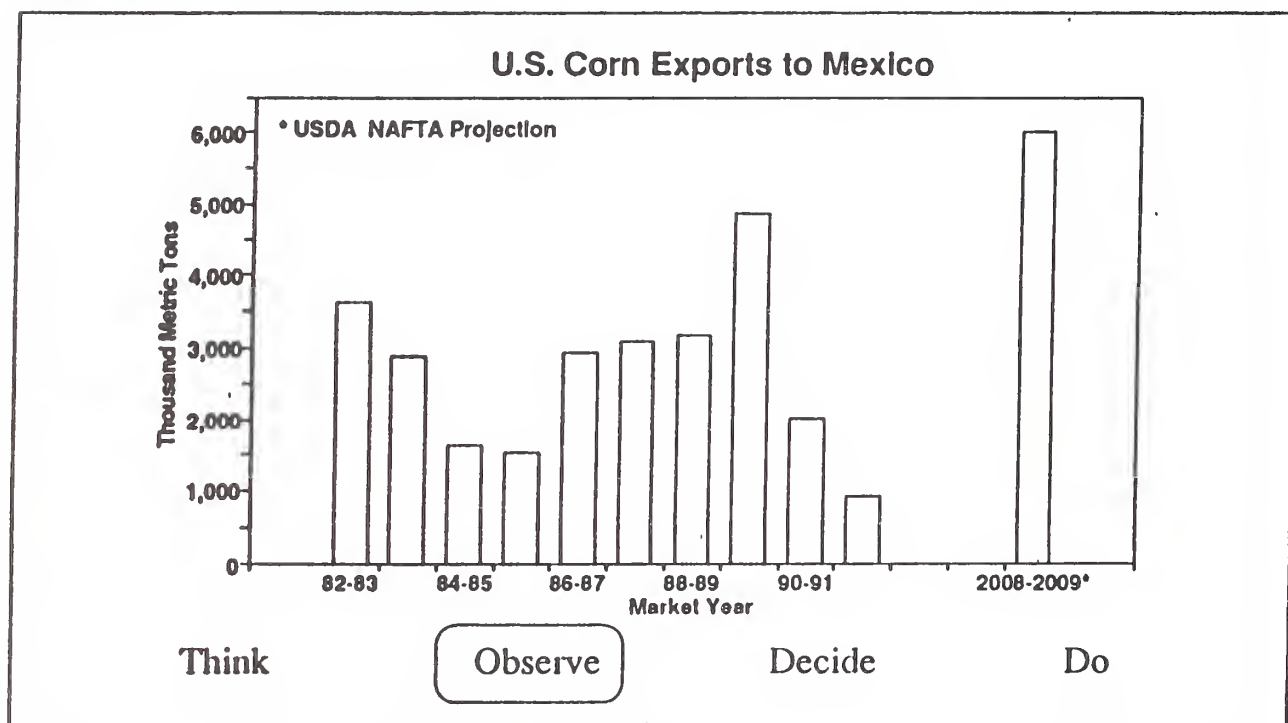


Figure 7

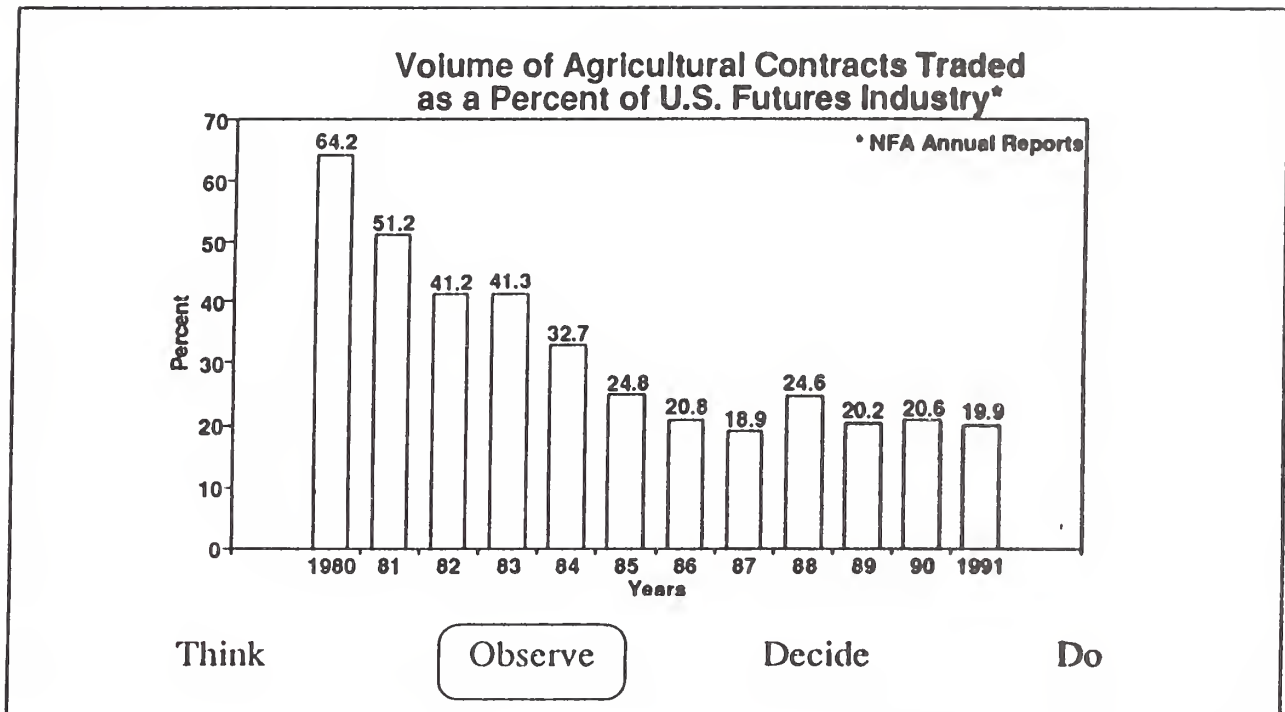


Figure 8

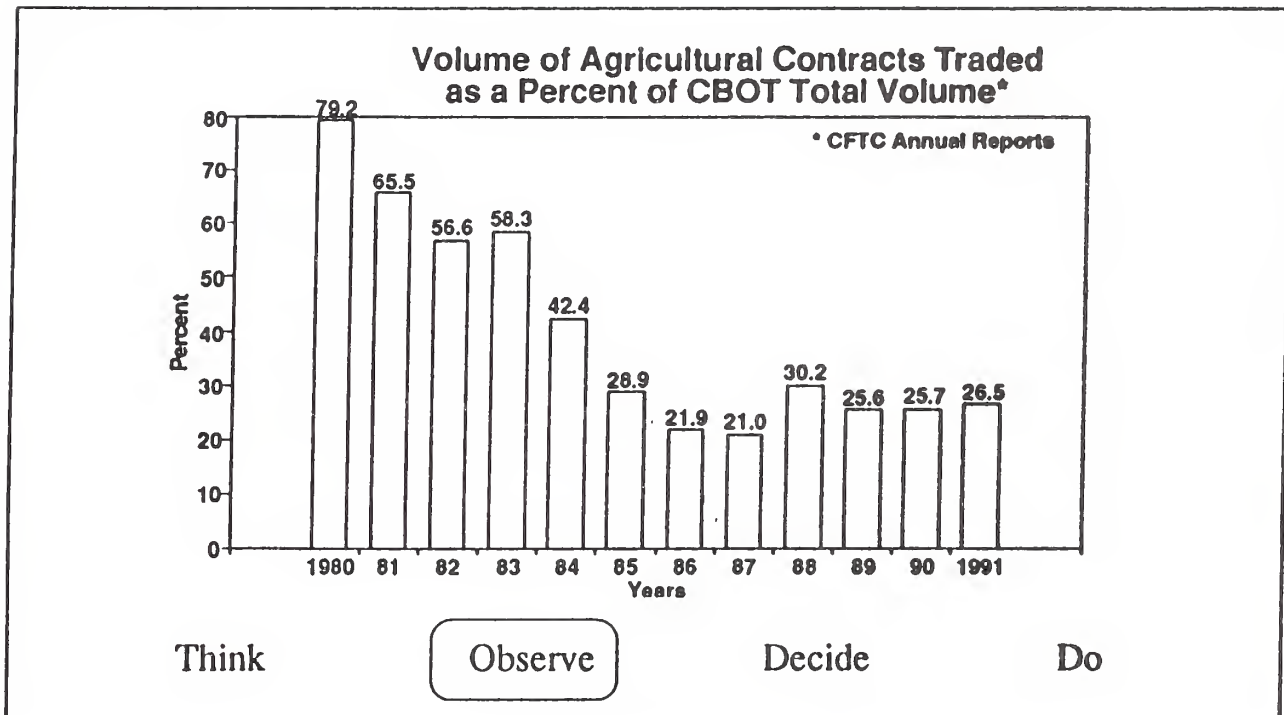


Figure 9

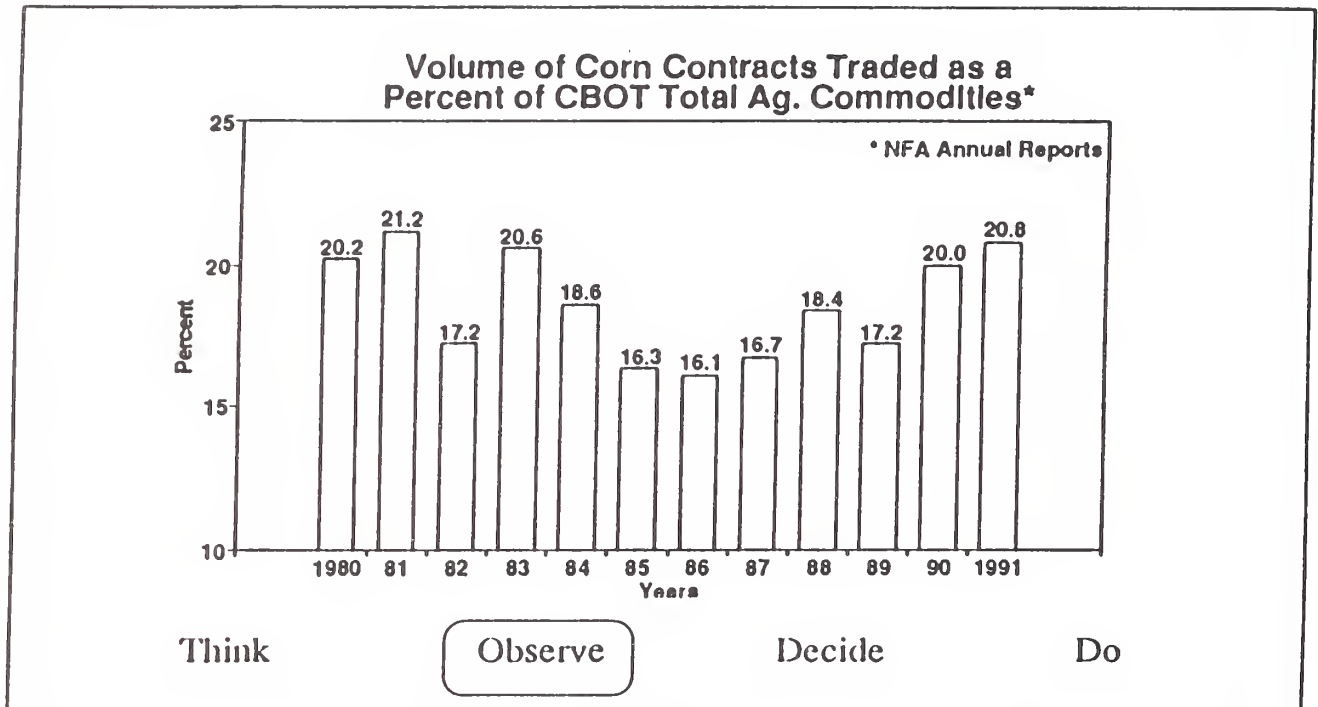


Figure 10

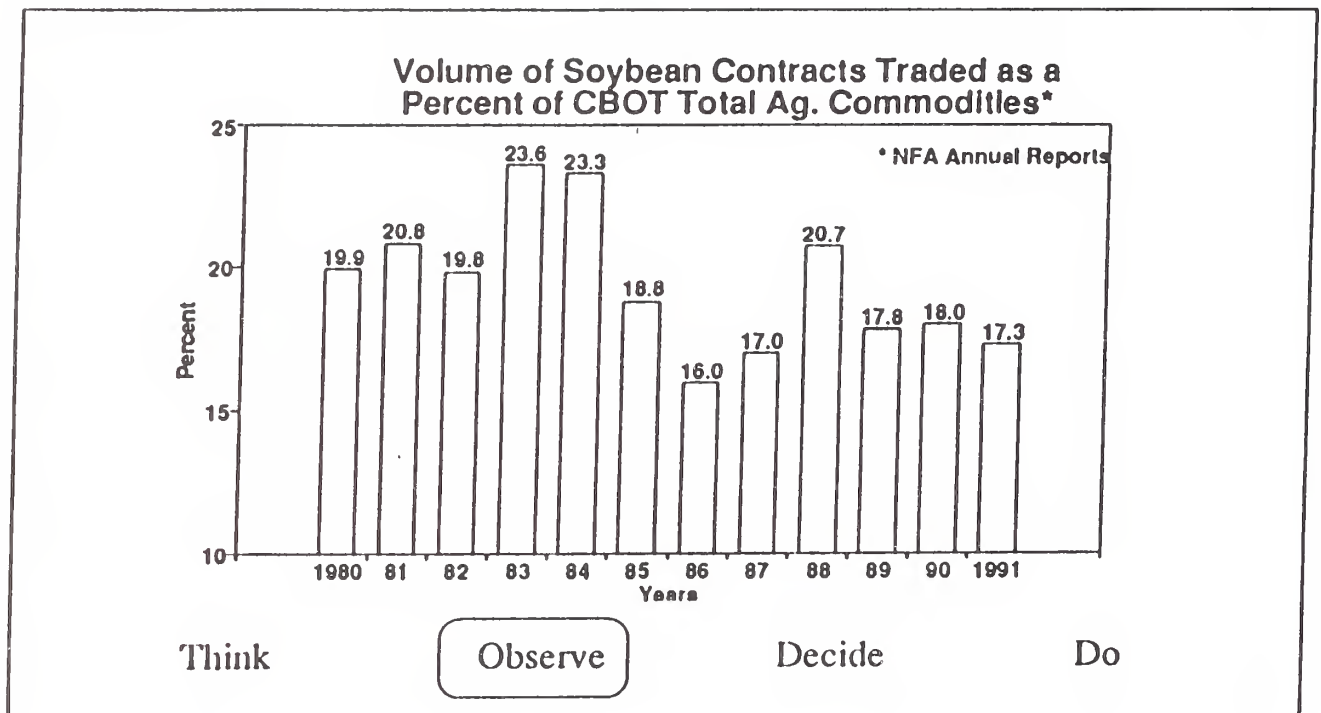
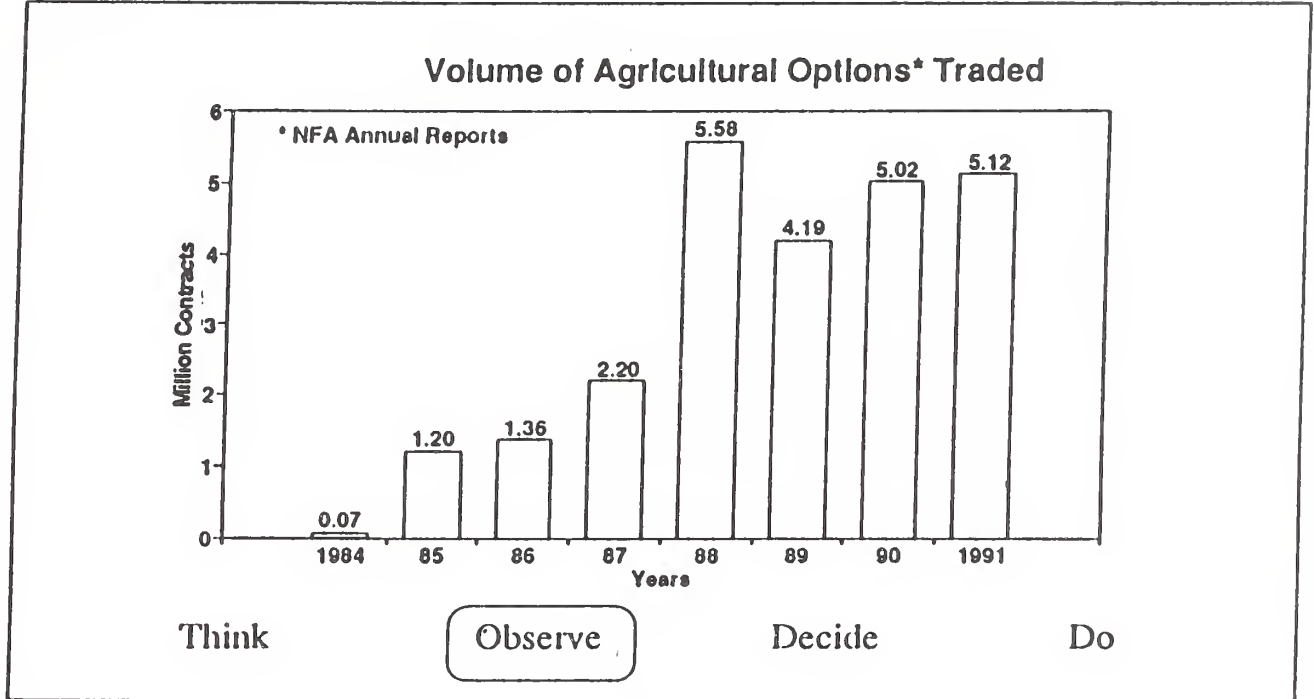


Figure 11



Outlook '93

For Release: Wednesday, December 2, 1992

THE OUTLOOK FOR ETHANOL DEMAND

John M. Urbanchuk
Vice President
AUS Consultants

The Clean Air Act Amendments of 1990 (CAA) offers one of the most significant opportunities for the expansion of demand of U.S. agricultural commodities, notably corn, in the past several decades. The CAA requires cities and metropolitan areas that do not meet national ambient air quality standards to come into compliance with carbon monoxide and ozone creating emission standards through the use of oxygenates in motor fuel. The provisions of the CAA, enhanced by the waiver of Reid Vapor Pressure requirements for gasoline blended with ethanol granted by President Bush on October 1, 1992, will provide ethanol -- made primarily from corn grown by American farmers -- the opportunity to fully participate in the market for oxygenated fuels. This opportunity will improve the quality of the nation's air, stimulate domestic markets for corn used to produce ethanol, improve revenue for American farmers, reduce government spending on agricultural programs, and create jobs.

Background

The CAA requires designated cities and metropolitan areas to come into compliance with carbon monoxide and ozone creating emission standards by the end of the decade. Internal combustion engines, principally motor vehicles, are the primary sources of these emissions. The CAA requires cities and metropolitan areas not in compliance with air quality standards to incorporate oxygenates into motor fuel sold and used in their areas to improve combustion and reduce emissions of carbon monoxide and ozone creating hydrocarbons. Ozone is not emitted directly by automotive exhaust, but is formed when volatile organic compounds (VOCs -- such as hydrocarbons) and nitrogen oxide react in the presence of sunlight and heat.

There are a number of alternatives that could be used to meet CAA requirements however the two oxygenates most readily available in commercial quantities are MTBE (methyl tertiary butyl ether) and ethanol. MTBE is an ether compound refined from methanol that can be blended with gasoline to improve its oxygen content. Most methanol is made from natural gas. Ethanol is an alcohol based fuel which can be produced from almost any raw material containing sugar or carbohydrates. Most ethanol produced in the United States is made from grain, with corn the most prevalent feed stock.

Two key provisions of the CAA will determine the demand for oxygenates in motor fuel:

- **Carbon monoxide program.** The CAA mandates that 39 cities and metropolitan areas not meeting carbon monoxide emission standards use motor fuel containing oxygenates during the five winter months of the year. This program began November 1, 1992 and will remain in effect until compliance is achieved. These 39 cities account for about 30 percent of the motor fuel used in the United States on a year around basis. Considering the five-month length of the season, the carbon monoxide market represents 13.5 percent of U.S. gasoline use.
- **Reformulated gasoline program (RFG).** The CAA requires that by January 1, 1995, the nine cities with the most severe ozone problems use reformulated gasoline throughout the year. These cities are New York, Los Angeles, Chicago, Philadelphia, Houston, San Diego, Baltimore, Milwaukee, and Hartford, New Britain. In addition to these cities, the nearly 70 other cities not in compliance with air quality standards may voluntarily "opt-in" to the reformulated gasoline program. When adjusted for those cities also in the carbon monoxide program to avoid duplication, a full opt-in of the RFG program will cover about 45 percent of the motor fuel used in the United States.

The CAA is clear on the approval of ethanol as an oxygenate for use in the carbon monoxide program, however the law is decidedly less clear about whether ethanol is approved for use in the RFG program. Each oxygenate has advantages and disadvantages. While ethanol provides a higher oxygen content than alternatives, it is more volatile, meaning it evaporates quickly. The fuel performance standards proscribed by the CAA are designed to reduce emissions of VOCs by at least 15 percent compared with 1990 levels. The standard measure of volatility is Reid Vapor Pressure (RVP). Under the CAA northern cities must achieve a minimum 8.1 pounds per square inch (psi) RVP during the summer. The RVP limit for southern cities is 7.2 psi. Because VOC emissions increase as volatility increases, the proposed regulations for the CAA put tight limits on gasoline volatility during the summer months when ozone problems are generally the greatest. Without any allowance, ethanol blends cannot meet these tight volatility limits.

Fortunately, there are several methods of reducing RVP including use of "sub-RVP" gasoline which can be used as a blend stock to which oxygenates are added. This "sub-RVP" stock would have a lower starting RVP measurement so that when an oxygenate such as ethanol is added, the total RVP would remain within established limits. California, for example, is expected to require the marketing of gasoline with 7.0 psi RVP in 1996.

Additionally, the formulation model used to achieve the 15 percent drop in VOCs in gasoline plays a significant role in deciding whether or not ethanol will be permitted. There are two basic models, simple and complex. Under the simple model most of the decline (12 percent) in VOCs comes from reducing RVP and a smaller share from increased oxygen. The complex model takes many more factors into consideration (such as sulfur and aromatics) and, as a result, provides the refiner a larger number of alternatives than just reducing RVP. The CAA calls for the use of the simple model during the first two years of the RFG program and does not make the complex model mandatory until 1997. The obvious concern is that the simple model

works against ethanol and by 1997, when the complex model comes into play, the oxygenate markets for reformulated gasoline may be locked-up, and ethanol will have been virtually excluded.

Politics is also playing a significant role in the rule making for implementation of the CAA. Most major farm groups, corn growers, and the corn refining industry have lobbied significantly on behalf of ethanol and the flexibility it adds to achieving the goals of the clean air legislation. On the other side of the issue, several stringent environmental groups have linked up with the oil industry in the most unlikely of alliances. The environmentalists appear to be primarily concerned about volatility and ozone creation while the oil industry wants to preserve the oxygenate markets for their products.

In response to this situation President Bush announced a multi-pronged program to encourage the use of ethanol in reformulated gasoline on October 1, 1992. The key elements of this program include:

- Granting a one pound waiver of RVP requirements for gasoline blended with ethanol in up to 30 percent of the total reformulated gasoline market in northern cities. Southern cities can choose the one pound RVP waiver for up to 20 percent of their market or stay with the present RFG program.
- Extension of the non-taxable Blender Tax Credit for ETBE. ETBE (ethyl tertiary butyl ether) is an ether based oxygenate made from ethanol. ETBE adds oxygen but is not as volatile as ethanol and does not absorb water like other alcohol based fuels.
- Expediting the development and use of the unrestricted complex model for reformulated gasoline by 1995 rather than 1997.

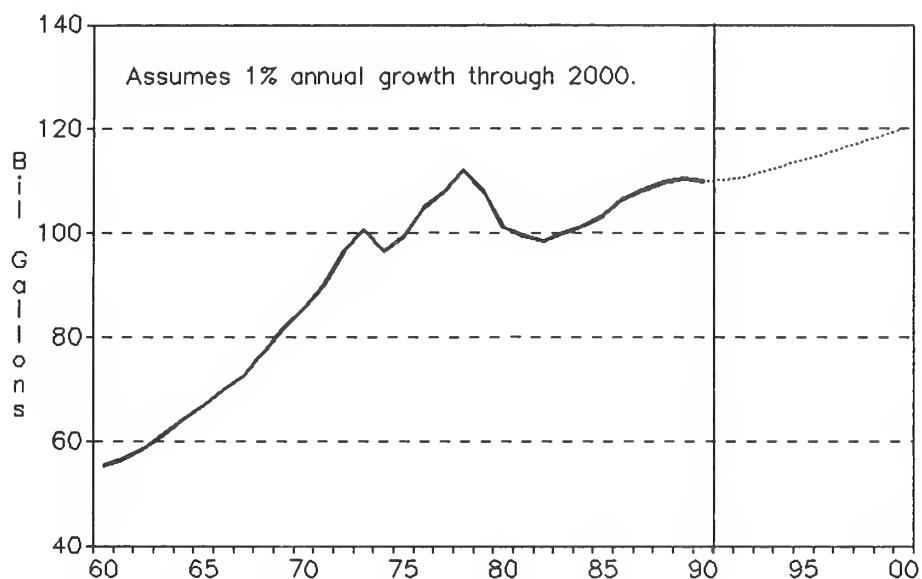
This announcement restores viability to the opportunity for ethanol in reformulated gasoline and helps ensure that the 39 carbon monoxide cities will have ethanol available as a viable alternative oxygenate.

Oxygenate Demand

The oxygenate market in the United States is large and even modest market shares will significantly benefit the corn sector and American agriculture. Before we proceed to describe the size of each market ethanol may realize, let's review a very basic and key assumption -- gasoline demand. Gasoline use in the United States will be the key driver for oxygenate demand regardless of source. As can be seen in Figure 1, U.S. highway gasoline use increased rapidly between 1960 and the mid-1970s. Recession and sharply higher prices caused by the oil embargoes combined to reduce highway gasoline use by over 10 percent between 1977 and 1982. The introduction of higher fuel economy automobiles offset rapid growth in the economy during the 1980s so that total gasoline use grew at a considerably slower rate than during prior decades. Highway gasoline use in the United States in 1991 totaled 110.3 billion gallons, still below the peak achieved in 1977. Technology will continue to improve fuel efficiency and permit

a greater number of highway miles to be driven on the same amount of gasoline. Based on discussions with oil industry economists and other experts, we have assumed a growth rate of one percent per year for total highway gasoline use, a rate about the same as that during the 1970-1990 period.

Figure 1
U.S. Highway Gasoline Use

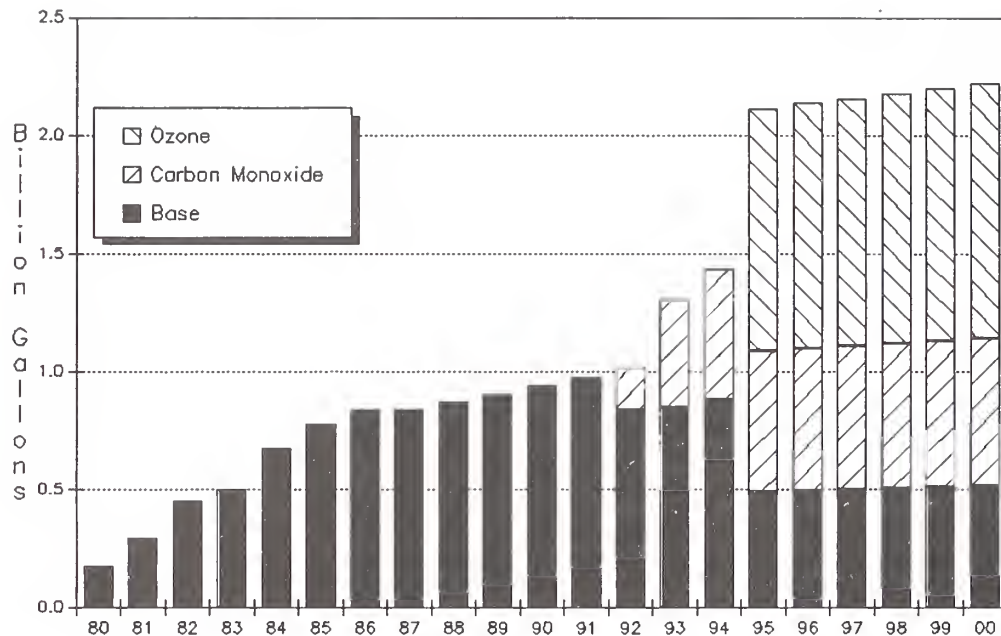


This means that while the market for oxygenates will expand, it will not expand rapidly. This also illustrates part of the concern of the oil industry: if your basic market is only growing by one percent per year, it is in your best interest to make sure that you continue to control all aspects of the market. If an oxygenate is required, make sure the oxygenate is made from a raw material you produce.

Ethanol Demand

Under the CAA there are three potential markets for ethanol: the base market which reflects those areas unaffected by the CAA; the carbon monoxide market consisting of 39 cities for the five winter months beginning in November 1992; and the year around reformulated gasoline market which opens in 1995. Figure 2 shows the growth in ethanol demand since 1980 and breaks out our projections for each of the three market segments through the year 2000. Over the last decade ethanol demand in the United States has increased from 175 million gallons to an estimated 1 billion gallons this year. Since one bushel of corn produces 2.5 gallons of ethanol, this year's ethanol use equates to almost 410 million bushels of corn or about 5 percent of total demand. Base demand for ethanol will decline the carbon monoxide program takes hold and cities opt-in to the reformulated gasoline program.

Figure 2
U.S. Ethanol Demand
(Billion Gallons)



Based on an anticipated market share of 30 percent for ethanol in the 39 non-attainment cities, the carbon monoxide program of the CAA is expected to result in ethanol demand of nearly 600 million gallons by 1995. It is important to note that this market will begin to contract as cities achieve compliance with carbon monoxide emission standards. While it is difficult to estimate this with any accuracy, we feel that given the overlap between CO and ozone cities and the pace of new technology in automobile engines, this contraction should be well underway by 2000.

The majority of this demand will be filled by a 10 percent blend of ethanol used directly as an oxygenate. However, an increasing share of ethanol demand is likely to be accounted for through the production and use of ETBE. As of this writing, there is very little commercial ETBE capacity available. We expect that the extension of the non-taxable Blender Tax Credit to ETBE, the approval of ethanol for use in reformulated gasoline, and willingness of gasoline refiners to look for an alternative primary feedstock for oxygenate production as a hedge against potential market swings in natural gas prices, will stimulate construction of ETBE facilities and production. Given this situation, we anticipate commercially available supplies of ETBE in 1994, and that ETBE could garner as much as 20 percent of the ether-based oxygenate market by 1995.

The big prize for ethanol will be the reformulated gasoline market. Assuming full opt-ins, the RFG program will cover almost 45 percent of total U.S. highway gasoline demand in 1995. Based on the provisions of the ethanol enhancement program announced by President Bush,

we feel that ethanol is likely to achieve a maximum market share of 10 percent of the RFG market, with most of this occurring in northern cities. This equates to nearly 500 million gallons of ethanol demand on the basis of a 10 percent blend.

The vast majority of the oxygenate market for reformulated gasoline will be filled by ethers. As discussed above, we expect that ETBE will participate in this market, achieving as much as a 20 percent share of ether-based oxygenate use. Given the size of this market, this is likely to add another 500 million gallons of ethanol demand per year.

If ethanol is permitted to fully participate in the reformulated gasoline market as outlined in the announcement made by President Bush in October, and ETBE production capacity comes on line by 1994, the Clean Air Act Amendments of 1990 are likely to increase total demand for ethanol in the United States to 2.2 billion gallons by 2000, more than double the amount used this year.

Implications for the Corn Sector and Agriculture

Increased use of ethanol as an oxygenate under provisions of the Clean Air Act Amendments as outlined above will provide a significant base of domestic demand for corn. As shown in Figure 3, corn used for ethanol production has increased from a negligible share of total demand in 1980 to almost 5 percent this season. By 2000 ethanol production is expected to account for almost 10 percent of total corn demand. When combined with food and other industrial use, which has also increased significantly as new uses for corn are discovered and commercialized, ethanol demand will exceed exports as a share of total demand by 2000. Development of this significant domestic market will provide a degree of protection from the vagaries of the export markets for corn farmers. Given changes taking place in the former Soviet Union, previously one of the largest individual market for U.S. corn, and the potential for Eastern Europe to become a net exporter of corn, the outlook for growth in export markets is less clear than at any time in the past two decades.

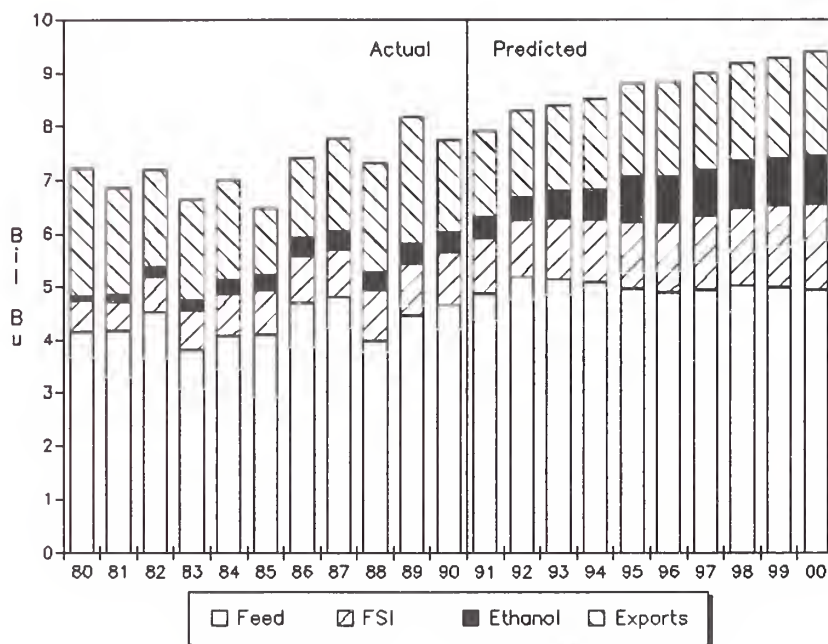
One of the most obvious features of figure 3 is our expectation that corn utilized for animal feed is expected to decline through 2000. This is not the result of a weak economy or declining animal numbers. In fact, we are assuming just the opposite to occur. The reason for the weakness in corn feed demand is that we expect livestock producers to increase substitution of by-products of ethanol production, corn gluten feed and distiller's dry grains, for grain corn.

Ethanol has an important side benefit: production of high quality mid-protein feed ingredient by-products. The wet milling process produces corn gluten feed in addition to ethanol while the dry milling produces distiller's dry grains. Both are used as non-grain feed ingredients. Most new ethanol capacity is likely to wet milling plants which can alternatively be used to produce high fructose corn syrup.

Corn gluten feed is a medium-protein feed ingredient deficient in amino acids. Recent expansion of lysine capacity has dramatically improved the feasibility of incorporating gluten feed in livestock rations. Currently most of the corn gluten feed produced in the United States is

exported, with most going to the European Community. Increased ethanol production will result in greater availability of corn gluten feed and lower prices for this ingredient. Since the EC is deficient in coarse grains, these lower prices should further stimulate demand for this ingredient. Under prevailing world trade rules and the announced reforms of the European Common Agricultural Policy are expected to keep this market open. Domestic livestock producers, particularly cattle feedlots, dairy operations, and hog feeders, are also expected to increase use of these ingredients.

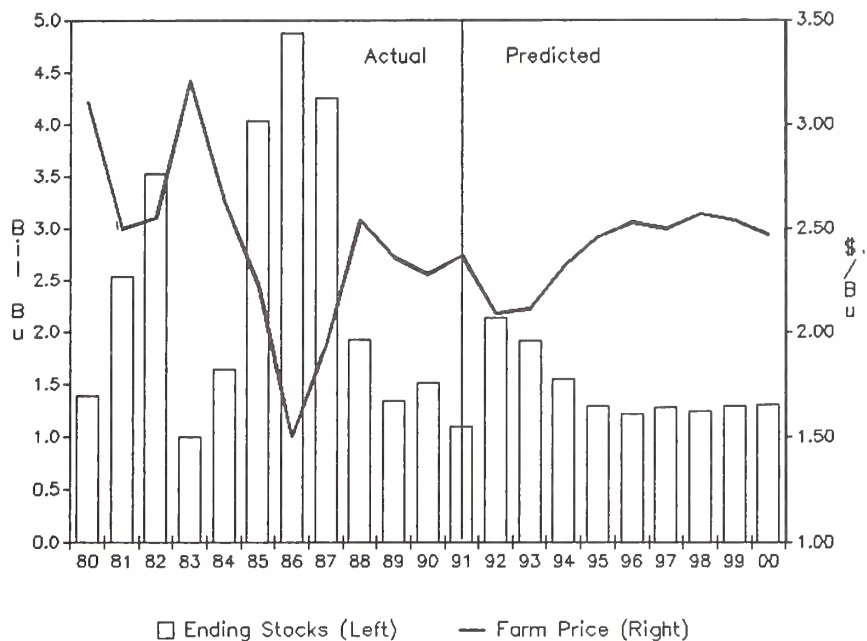
Figure 3
U.S. Corn Utilization
Impact of Ethanol Demand



The demand path for ethanol described above will benefit farmers by providing market derived support for prices and benefit taxpayers by reducing direct government payments to corn farmers. A strong domestic base of demand is expected enable the Secretary of Agriculture to maintain a relatively low set-aside requirement for corn through 2000 thereby encouraging corn farmers to plant and produce. We anticipate that, assuming trend growth in corn yields, farmers would have to plant a maximum of 79.3 million acres in order to meet ethanol demand without significantly reducing stocks.

Figure 4 displays the expected path of corn stocks and farm level prices through 2000 consistent with the ethanol demand scenario outlined above.

Figure 4
U.S. Corn Ending Stocks and Farm level Price



The combination of increased demand for ethanol, moderately reduced feed use, and trend production is expected to maintain corn stocks at about the 1.3 billion bushel level during the second half of the decade, and provide an average farm level corn price of about \$2.40 per bushel. By comparison, ending stocks of corn for the 1992/93 season are currently projected to reach 2.1 billion bushels providing a season average corn price of \$2.09 per bushel.

The price path provided by increased ethanol demand is expected to improve net cash income for corn farmers to nearly \$162 per planted acre by 2000 compared with an estimated \$135 per acre last season. Equally important, this return will be provided by the market, not the government. By 2000 direct government payments to corn farmers are projected to decline to under \$2 billion from nearly \$5 billion expected this season.

The Economic Impact of Increased Ethanol Capacity

Ethanol can play a major role in the new administration's programs for job creation through investment in infrastructure since new ethanol capacity will have to be created to meet the demand provided by the Clean Air Act. Current ethanol capacity in the United States totals just over 1 billion gallons. Industry sources indicate 691 million gallons of new ethanol capacity

is either under construction or on hold, waiting for clarification of rules for reformulated gasoline.¹ Of this amount, 250 million gallons are listed as expansion of existing facilities. Based on our projection of total ethanol demand of 2.2 billion gallons by 2000, an additional 400 million gallons of capacity will have to be constructed. Using the general rule of thumb that it costs \$1.00 per gallon to expand existing capacity and \$2.50 per gallon for new capacity, a total of 1.1 billion gallons of new capacity (691 million reported by Chemical & Engineering News plus 409 million additional) will require a total investment of nearly \$2.4 billion over the next eight years.

This investment will create output and jobs, and generate income in the states where ethanol capacity is built. On a national level, this investment alone will add over \$8 billion to GDP, generate nearly \$2.35 billion in new household income, and create almost 92,000 new jobs.² These numbers do not include the impact of increased agricultural output resulting from enhanced ethanol demand, or increased output by the corn processing industry.

What can go wrong?

Clearly the potential for agriculture resulting from increased ethanol use consistent with the CAA is bright. Unfortunately, this future is not yet certain. The primary obstacle facing this outlook is political and depends in large part on whether President-elect Clinton will retain the incentives announced by president Bush in October. Recision of these incentives would significantly limit the ability of ethanol to participate in the future environmental market.

It is impossible at this point in time to predict the outcome of that decision, however we can expect both the environmental movement and oil industry to step up pressure on the new administration. It is incumbent on those of us in agriculture to continue to stress the positive benefits that ethanol will provide for the environment, farmers, and taxpayers. We should also point out that the potential market for oxygenates is large enough for alternatives to MTBE and that it is also in the best interest of the oil industry to build in flexibility regarding sources of oxygenate supply.

¹. Anderson, Earl V. "Ethanol's Role in Reformulated Gasoline Stirs Controversy". Chemical & Engineering News. November 2, 1992. p.10.

². Calculated by applying the U.S. level multipliers for new construction to the \$2.4 billion new investment. The multipliers were calculated by the Bureau of Economic Analysis, U.S. Department of Commerce (Regional Input-Output Modeling System (RIMS II), updated May 1992.)

Outlook '93

For Release: Wednesday, December 2, 1992

OUTLOOK FOR GRAIN BYPRODUCTS

Presented by Harry Ambrose

World Milling Group, Continental Grain Company

At the U.S. Department of Agriculture Outlook Conference

Washington, DC

December 2, 1992

Total grain production in the U.S. was 338 million tons this year. Of this, 49% will be fed to livestock and poultry, 26% will be exported, and the rest processed into flour, starch, syrup, alcohol and byproducts of wheat and corn. The byproducts total 11 million tons, all of which is fed either domestically or in the EEC.

Corn gluten feed production is now larger than wheat middlings. This is a significant change because the growth of wet corn milling has been impressive while wheat flour milling has been relatively static. Wet corn milling is expected to grow into the foreseeable future.

All of the wheat middlings are used domestically for livestock and poultry feed. Almost all of the corn gluten feed is exported to the EEC because it is allowed to enter there free of levy. Due to the high grain prices within the EEC, corn gluten is able to fetch a higher price for export than it can be sold for domestically. Its most recent value is about \$125 per short ton Fob U.S. Gulf, about one third higher than corn and wheat middlings. Most U.S. users consider the three commodities to have roughly similar nutritional values so the domestic market hardly uses any corn gluten feed.

Because of high internal grain prices within the EEC, corn gluten feed is priced very attractively for feed compounding inside that market. Historically it has been bought there in ever increasing quantities as the U.S. wet corn milling industry has grown. In my estimation, this situation will continue so long as it is priced about as it is now relative to grain.

This situation is very favorable for U.S. feed grain producers. On the one hand, they have the benefit of the growing demand from the wetcorn industry. On the other, their domestic feed grain demand does not suffer from the increasing competition of the corn gluten feed being produced as a byproduct.

Of course, the key to continuing this favorable situation is maintenance of the levy free entry into the EEC combined with high grain support prices. There is the threat that the U. S. will take action against EEC imports as a way of forcing the EEC to abide by the trade agreements of GATT. In turn the EEC might choose to retaliate by putting a levy on corn gluten feed and/or soybean meal. The present levy in the EEC on wheat middlings is about \$100 per ton. Even a \$50 levy on gluten feed would force most of it to be sold within the U.S.

This would certainly have a significant impact on all feed ingredient prices -- especially grain byproducts, but also corn and soybean meal. The magnitude has been estimated at 4 cents per bushel. I accept that for the long run, but think it would be more in the short term.

If we can maintain the status quo, then I believe that feed grain prices will actually benefit from growth in wet corn milling due to the additional demand. For the longer term it seems likely to me that there will be an increase of corn gluten feed and distillers grains being fed to livestock in the natural form, i.e. 45% dry matter. This will obviate the necessity of drying the byproduct, which is very expensive. It will require very close cooperation between the byproduct producer and livestock owner.

Thus, it seems likely that wet millers will invest in feeding livestock at locations very close to their plants. Not only will this be more efficient financially, but it should be sound environmentally because of the energy saving. One of the primary challenges will be manure disposal. But I have no doubt that this can be done satisfactorily when good minds are applied to the problem.

END

Outlook '93

For Release: Wednesday, December 2, 1992

OUTLOOK FOR FARM BUSINESS EARNINGS

Robert G. McElroy
Leader, Economic Indicators Forecasts, ERS

Current indications point to higher 1992 net incomes than were forecast this past September. Rising yield projections for this year's crops have offset somewhat lower prices, giving higher crop receipt forecasts which are more than offsetting lower livestock receipts. Commodities showing the most change in receipts are wheat, vegetables, and dairy products.

In addition to the higher '92 receipts, expenses are forecast down 1 percent. Published prices paid indices for major inputs were lower for the third and fourth quarters than were being forecast earlier, holding down expenses even with increased acreage. This is after stable expenses for 1991.

Current forecasts point to '92 net cash income of \$60 billion (up 4-5 percent over 1991) and net farm income of \$51 billion (up 13-14 percent). Net farm income is up more than net cash income due to an additional \$4 billion in inventories that are expected to be carried over into calendar 1993. This leaves 1992 cash earnings just below 1990's record. These earnings imply that farmers and ranchers have managed to control and actually cut costs after weathering the financial crisis of the early 1980's.

Record '92 Production Leading to Lower '93 Prices

Crop production reports over the past few months have shown record or near-record yields and production mentioned each month. The November report is showing this year's corn crop at its highest ever, wheat yields just one-tenth bushel under the record, soybean production up 9 percent from last year and the highest since 1982, and rice production the second-highest on record. Upland cotton output, however, is expected to be down from 1991/92 due to lower acreage. Many acres originally planted to cotton in the Southern High Plains this year were abandoned early in the season due to abnormal wetness and replanted to sorghum. Prices throughout the rest of the 1992/93 marketing year are expected to be down for all major field crops.

On the livestock side, red-meat production will probably continue rising in 1993. Hog producers are reporting they intend to have 3 percent more sows farrow this winter. Pigs saved per litter continue to set record highs. This points to higher pork production at least through next summer. Higher pork production will likely lead to prices down \$1-\$2 in 1993.

Poultry and egg receipts have been increasing the past several years. For 1993, analysts expect broiler production to increase with prices steady to rising slightly. Turkey production is also expected to increase. Low turkey prices the past two years have dampened earnings but there has been some strengthening this fall. Lower feed costs expected next year will benefit the industry.

Milk production is expected to continue increasing slightly into 1993 and prices will likely fall by up to \$1 per hundredweight.

'93 Receipts Expected Stable to Down Slightly

Record 1992/93 crops will likely put downward pressure on prices and cause crop cash receipts to fall. First forecasts for next year, however, are showing receipts down only slightly. Wheat is showing the largest drop of \$500-\$900 million (7-9 percent). This is coming on the heels of 1992's near-record level of wheat receipts and could still be the fourth or fifth highest-valued U.S. wheat crop ever. Receipts for the other major field crops are down, but each by less than \$200 million.

Two crop sectors could see higher receipts next year. Cotton growers saw very low prices throughout most of 1992 in response to high 1991/92 world cotton production. Cotton receipts could rise next year. The greenhouse and nursery sector is another area that has seen steady growth for many years. With receipts typically \$8-\$9 billion, this sector rivals wheat in its importance to the agricultural economy. With some strengthening expected next year in the general economy, demand for household and landscaping plants should increase.

Cash receipts for red-meat producers declined in 1991 and 1992. As production of both beef and hogs continued increasing, prices continued weakening. For 1993, livestock analysts are expecting some strengthening. Beef production and prices are stabilizing which could stop the last two years' decline in cattle and calves receipts. The same could happen with hogs. Prices are still forecast near breakeven levels but higher production could bring about slightly higher receipts.

With broiler prices expected up at least through the first half of 1993, higher production will likely lead to higher receipts. Eggs, with declining receipts the past two years, are expected to recovery to at or above 1990's level.

Dairy receipts have been up and down the past several years. After reaching a record level in 1990, prices fell causing receipts to drop in 1991. The sector is recovering this year to near 1990's record, but lower 1993 prices will likely lead to receipts at or just above 1991's level.

Government Payments Could Rise for First Time in 6 Years

Direct Government payments on a calendar-year basis have fallen each year since 1987's high of \$16.7 billion. However, with the low program-crop prices

expected from 1992/93's record production, 1993 deficiency payments will likely rise. This is particularly true for corn and other feed grains. Feed-grain payments are expected to nearly double next year and wheat payments are forecast up by nearly the same percentage. Should conditions hold as currently expected, total direct cash payments would average \$10-\$12 billion, up 25-40 percent from 1992.

Expenses Rising 1-2 Percent

In both 1991 and 1992, as currently forecast, production expenses actually fell. Much of the declines came from falling feeder livestock prices responding to higher production and falling fuel prices after the Iraq war. Next year, analysts are expecting input expenses to begin rising again. While lower expected feed prices will result in lower feed expenses, all other major expense accounts are indicating higher levels.

'93 Net Cash Income Could Approach 1990 Level

The result of just slightly lower receipts, much higher Government payments, and only slightly higher cash production expenses is higher net cash income forecast for 1993. Ranging from \$58-\$64 billion, net cash income could be up 1-2 percent, very near or equal to 1990's record. For net farm income, which includes noncash income and expense components, the first forecast is indicating something in the range of \$42-\$48 billion. This forecast is down 12-13 percent from 1992's record-tying level of \$51 billion, but could still be higher than in 1991. Change in inventories is a major factor this year and next in the expected level of net farm income. Increased 1992 grain production is providing more grain than can be sold in 1992. This will likely add \$4 billion to net farm income in 1992 and reduce it by \$2-\$3 billion in 1993 as the excess grain clears the market.

Most Farms and Ranches To See Earnings Up

U.S. forecasts indicate higher sector net cash incomes for next year. More enlightening than these aggregate numbers, however, is their distribution among types of farming and ranching operations. If 1993 production and prices are near the levels currently forecast, we can expect the majority of farm businesses to see higher net incomes than the past few years. Cash grain farms in general are indicating 2-3 percent higher incomes. This is not coming from higher grain prices, however, but rather from higher direct payments. Cotton farms could be in a similar situation with crop receipts steady to down slightly, but additional direct payments causing net incomes to rise 2-4 percent. Fruit and vegetable operations do not receive direct payments in any appreciable amount so if fruit prices remain steady and vegetable prices fall slightly, net incomes for these producers could fall. In every case, incomes are influenced by commodity mix and the operation's particular cost structure, so these farm-type analyses are just general indicators of more complex relationships.

General livestock farms could see net cash incomes drop 2-3 percent next year. This is primarily due to the influence of dairy farms in the livestock sector.

With some price recovery in beef and hogs, red-meat operations will likely have higher incomes. The largest percentage increase in incomes to livestock producers could come in poultry and egg operations as strong egg prices influence 1993 receipts. Dairy-farm income may fall 10-20 percent if prices drop to currently-forecast levels. This lower dairy income will still be higher than the levels seen in 1991.

When the sector is examined by economic size of operation, commercial farms (those with gross sales of more than \$40,000) are showing slight drops in net cash incomes for next year while small, often part-time, operations have higher incomes. Higher incomes on the smaller operations can be explained by the relative importance of direct payments to total earnings. On the smallest farms, payments average 6-10 percent of gross cash income, while on the larger commercial farms, payments average 5 percent or less.

Midwest and Southeast Continue Improvement

This past year many farmers in the Midwest and Southeast saw their net incomes rise. This was influenced by the strength of the wheat sector in the Midwest and the fruit and vegetable sectors in the Southeast. Low red-meat prices hurt Midwestern livestock operations and low cotton prices, combined with lower production, hurt Southern and Western cotton growers.

For 1993, analysts are predicting improvement in red-meat receipts, which will benefit the Midwest. Weakening in dairy prices will likely hinder the Northeast and Great Lakes areas. Strong poultry and egg sectors will assist the Southeast and Southcentral regions.

Reliability of Financial Forecasts

USDA's short-run farm income forecasts are based on an accounting model and are updated quarterly. The forecasts in this paper reflect conditions that were expected as of mid-November. The forecasts are based on final U.S. estimates (currently 1991) which are moved by quarterly prices and quantities forecast by USDA commodity analysts. These price and quantity forecasts are the same as those being presented in the many commodity sessions at this conference. The resulting financial forecasts are revised each succeeding quarter until the final estimate is made approximately 18 months (6 quarters) after the first forecast.

An error analysis over the past 8 years compared the Outlook Conference forecasts and subsequent revisions over 6 quarters to the final estimates to determine the proportional differences by income component. Bottom-line net cash income was underestimated an average of 16 percent annually, ranging from \$2.1 billion to \$13.7 billion. Net farm income was off an average of 14 percent, being underestimated 6 out of the 8 years. The major causes were a 24-percent error in forecasting direct payments, a 34-percent error in farm-related income, and a 115-percent error in the value of the change in inventories (only used in forecasting net farm income). Receipt and expense forecasts were much more reliable with errors of only 4-5 percent, being

overestimated as often as underestimated. After 4 quarters, the forecasts of net cash income should improve to within 6 percent of the final estimate.

Farm income statements

	1989	1990	1991	1992F	1993F
Billion dollars					
Cash income statement:					
1. Cash receipts	161.0	169.9	167.3	169	165 to 172
Crops 1/	76.9	80.0	80.5	84	81 to 86
Livestock	84.1	89.9	86.7	86	83 to 87
2. Direct Government payments	10.9	9.3	8.2	8	9 to 13
3. Farm-related income	8.2	7.2	7.6	7	6 to 8
4. Gross cash income (1+2+3)	180.2	186.4	183.2	185	183 to 191
5. Cash expenses 3/,4/	121.2	125.2	125.2	124	123 to 129
6. NET CASH INCOME (4-5)	58.9	61.3	58.0	60	58 to 64
Deflated (1987\$) 5/	54.3	54.1	49.2	50	46 to 52
Farm income statement:					
7. Gross cash income	180.2	186.4	183.2	185	183 to 191
8. Nonmoney income 6/	6.2	6.1	5.9	6	5 to 7
9. Inventory adjustment	4.8	3.5	.4	4	-5 to -1
10. Total gross income (7+8+9)	191.1	196.0	189.5	195	186 to 195
11. Total expenses	141.2	145.1	144.9	144	143 to 149
12. NET FARM INCOME (10-11)	49.9	51.0	44.6	51	42 to 48
Deflated (1987\$) 5/	46.0	45.1	37.9	42	33 to 39

F = forecast. Totals may not add due to rounding.

1/ Includes CCC loans. 2/ Income from custom work, machine hire, recreational activities, forest product sales, and other farm sources. 3/ Excludes depreciation and perquisites to hired labor. 4/ Excludes farm households. 5/ Deflated by the GDP implicit price deflator. 6/ Value of home consumption of farm products plus the imputed rental value of operator dwellings.

Farm commodity cash receipts

	1989	1990	1991	1992F	1993F
Billion dollars					
Crop receipts:					
Food grains	8.2	7.5	6.8	9	7 to 9
Wheat	7.3	6.4	5.7	7	6 to 8
Rice	.9	1.1	1.1	1	1 to 2
Feed crops 1/	17.1	18.7	19.0	20	18 to 22
Corn	11.4	13.4	13.9	15	14 to 16
Barley, oats, and sorghum	2.3	2.0	2.1	2	1 to 3
Oil crops 1/	11.9	12.3	12.5	13	11 to 13
Soybeans	10.5	10.8	10.8	11	10 to 12
Peanuts	1.1	1.3	1.4	1	1 to 2
Cotton (lint and seed)	5.0	5.5	5.6	4	4 to 6
Tobacco	2.4	2.7	2.9	3	2 to 4
Fruits and nuts	9.3	9.5	9.9	10	9 to 12
Vegetables	11.5	11.5	11.3	12	11 to 13
Greenhouse and nursery	7.6	8.2	8.4	9	8 to 9
TOTAL CROPS 1/	76.9	80.0	80.5	84	81 to 86
Livestock receipts:					
Red meats	46.9	51.9	51.1	48	45 to 53
Cattle and calves	36.9	39.9	39.6	38	36 to 41
Hogs	9.5	11.6	11.1	10	10 to 11
Sheep and lambs	.5	.4	.4	*	0 to 1
Poultry and eggs 1/	15.4	15.2	15.1	15	14 to 18
Broilers	8.8	8.4	8.4	9	8 to 10
Turkeys	2.2	2.4	2.3	2	2 to 3
Eggs	3.9	4.0	3.9	3	2 to 4
All dairy	19.4	20.2	18.1	20	17 to 20
TOTAL LIVESTOCK 1/	84.1	89.9	86.7	86	83 to 87
TOTAL RECEIPTS	161.0	169.9	167.3	169	165 to 172

F = forecast. * = less than \$500 million.

1/ Includes commodities not listed separately.

Farm production expenses

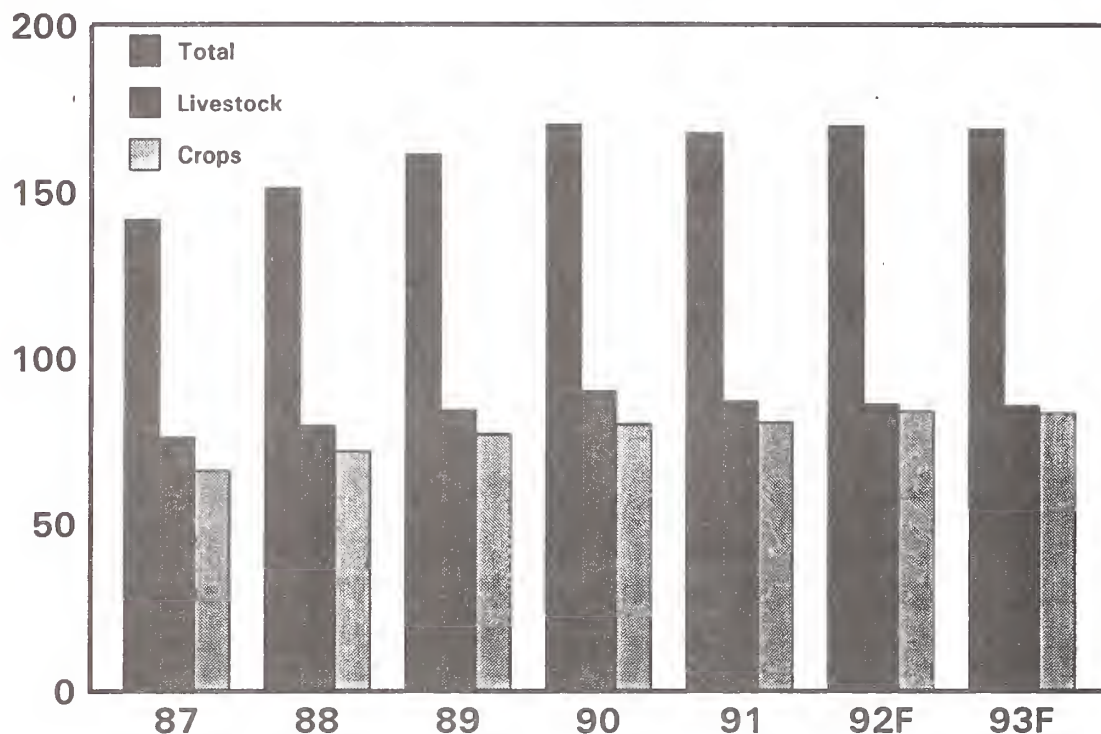
	1989	1990	1991	1992F	1993F
Billion dollars					
Farm origin inputs	37.7	39.1	38.1	38	35 to 39
Feed	21.0	20.7	19.8	20	18 to 22
Livestock	13.1	14.8	14.4	14	12 to 16
Seed	3.6	3.6	4.0	4	3 to 5
Manufactured inputs	20.0	21.1	21.7	21	20 to 24
Fertilizer	7.2	7.1	7.4	7	5 to 9
Fuels and oils	4.8	5.7	5.5	5	4 to 7
Electricity	2.5	2.5	2.5	2	2 to 4
Pesticides	5.4	5.7	6.3	6	5 to 7
Total interest charges	14.7	14.5	13.9	14	12 to 16
Short-term interest	6.9	6.9	6.6	6	5 to 8
Real estate interest	7.8	7.6	7.3	7	6 to 8
Other operating expense	37.7	38.9	40.3	40	39 to 44
Repair and maintenance	7.3	7.3	7.2	7	7 to 9
Hired labor expenses	11.1	12.5	12.6	12	10 to 14
Machine hire & customwork	2.7	2.6	2.7	3	2 to 4
Animal health	1.5	1.5	1.4	1	0 to 2
Marketing, storage, and transportation	4.1	4.0	4.5	5	4 to 6
Misc. operating expenses	11.0	10.9	11.9	12	10 to 14
Overhead expenses	31.1	31.4	30.8	31	30 to 33
Capital consumption	17.8	17.5	17.4	18	16 to 20
Property taxes	5.1	5.6	6.0	6	5 to 7
Net rent to non-operator landlords	8.2	8.3	7.5	8	7 to 9
TOTAL PRODUCTION EXPENSES	141.2	145.1	144.9	144	143 to 149
Noncash expenses	16.4	16.3	16.2	16	16 to 17
Labor perquisites	.5	.5	.5	*	
Cap. cons. exc. dwelling	16.0	15.8	15.7	16	
Dwelling expenses	3.6	3.6	3.5	4	3 to 4
Capital consumption	1.8	1.7	1.7	2	
Interest	.5	.5	.5	*	
Taxes	.6	.6	.6	1	
Repairs & maintenance	.5	.6	.6	1	
Insurance	.2	.2	.2	*	
CASH EXPENSES 1/	121.2	125.2	125.2	124	123 to 129

F = forecast. * = less than \$500 million.

1/ Total expenses minus noncash and operator dwelling expenses.

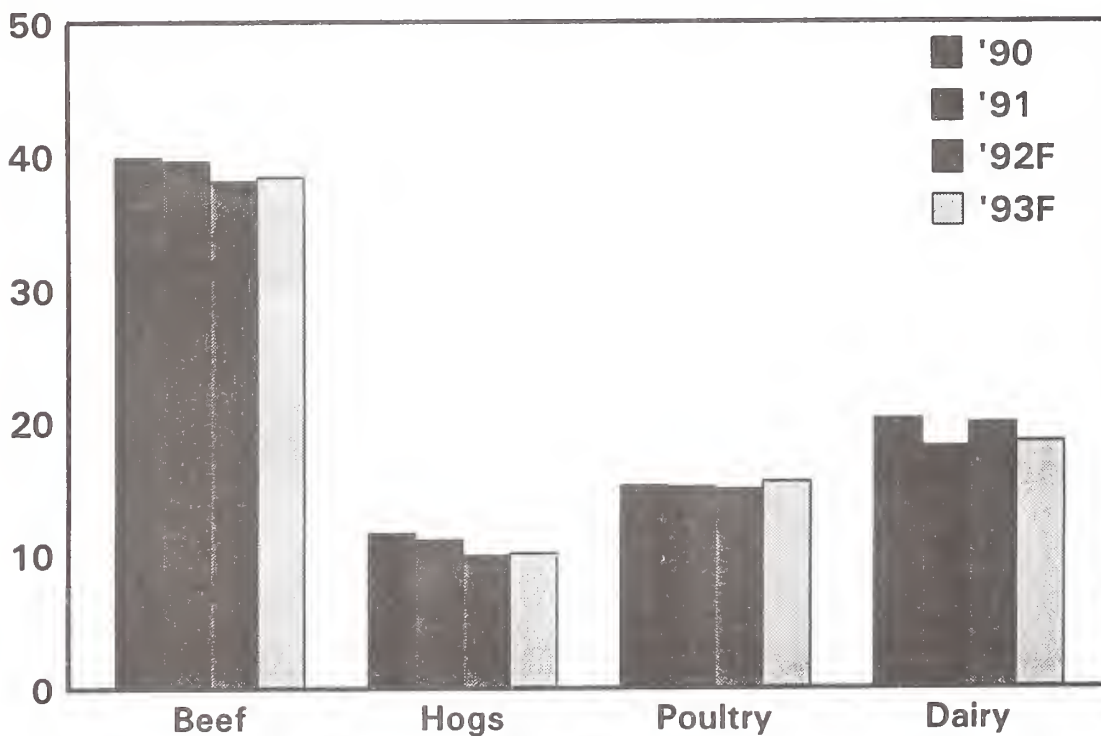
Total '92-'93 Cash Receipts Recovering

Billion \$



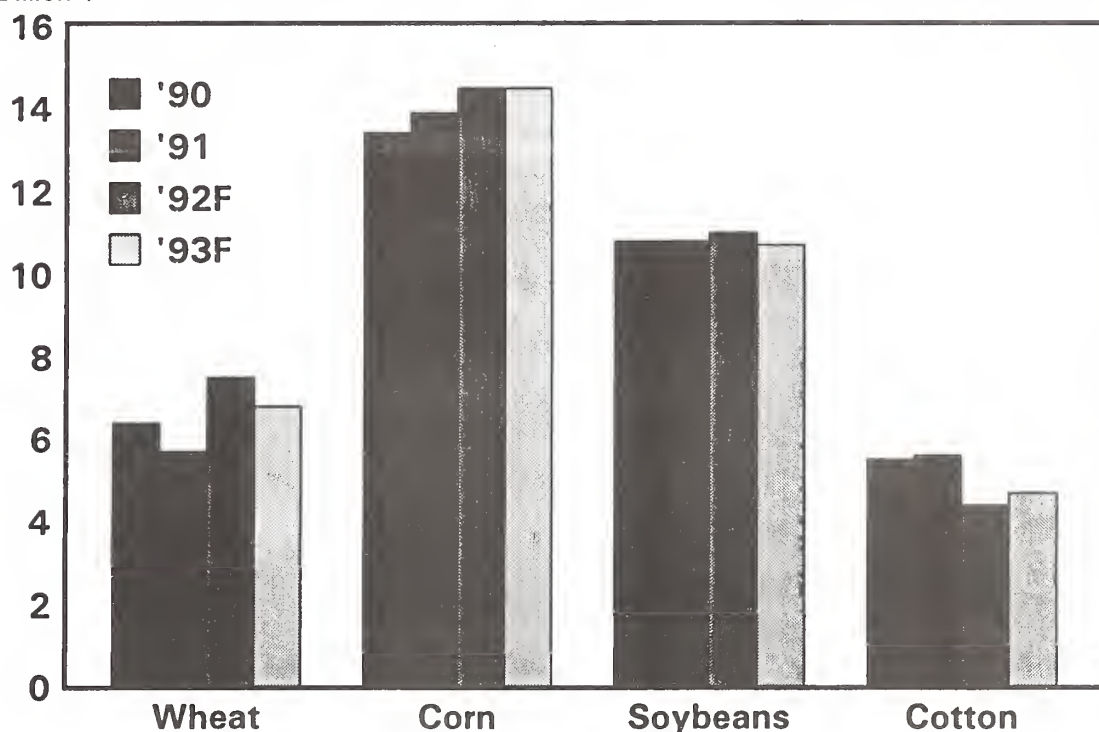
'93 Livestock Receipts Improving

Billion \$



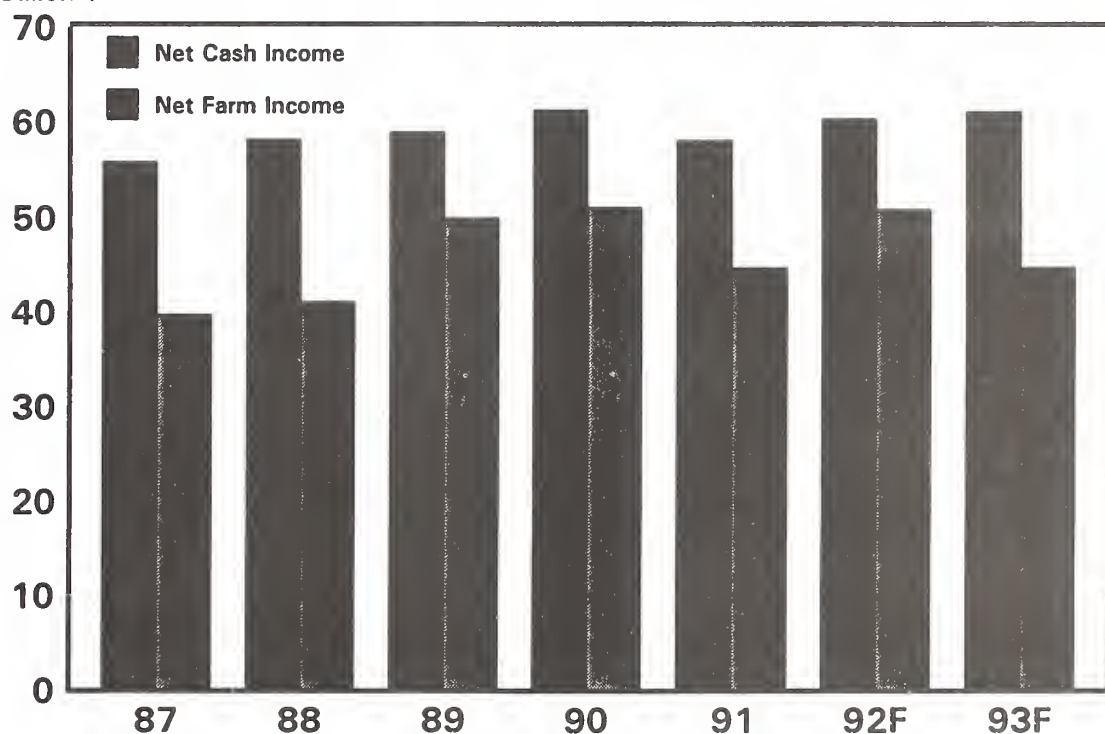
Weather & Foreign Production Affecting Crops

Billion \$



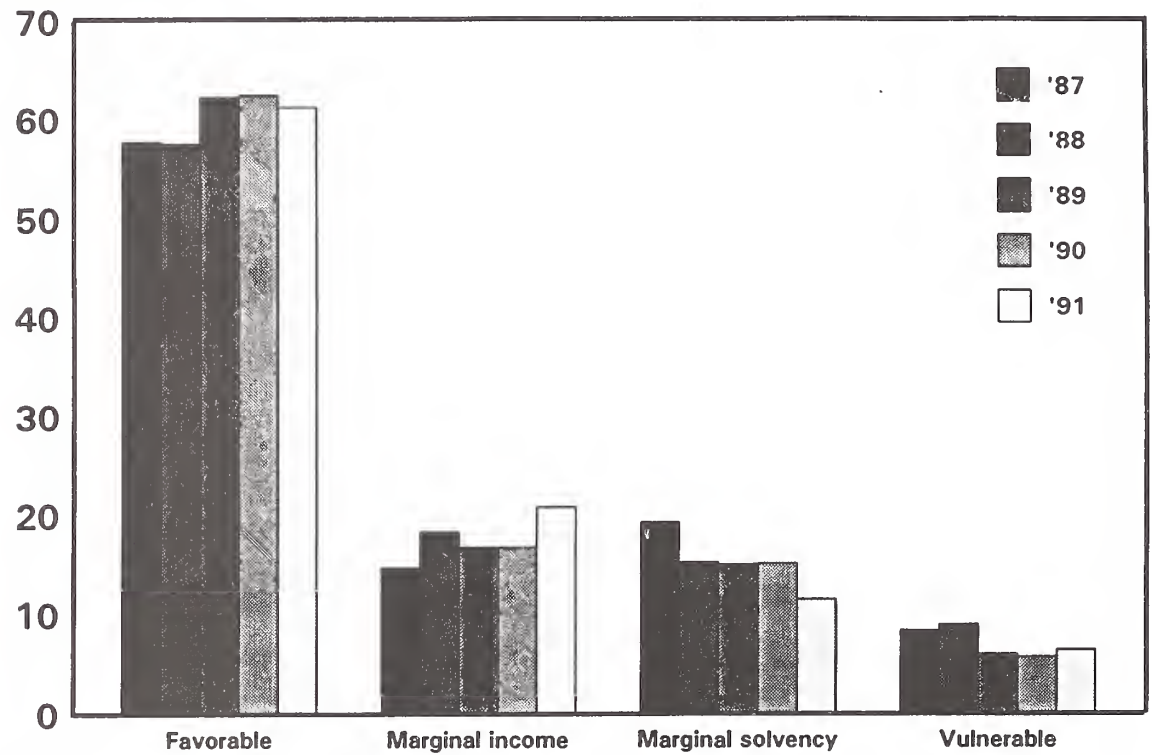
Healthy Earnings Expected for '93

Billion \$



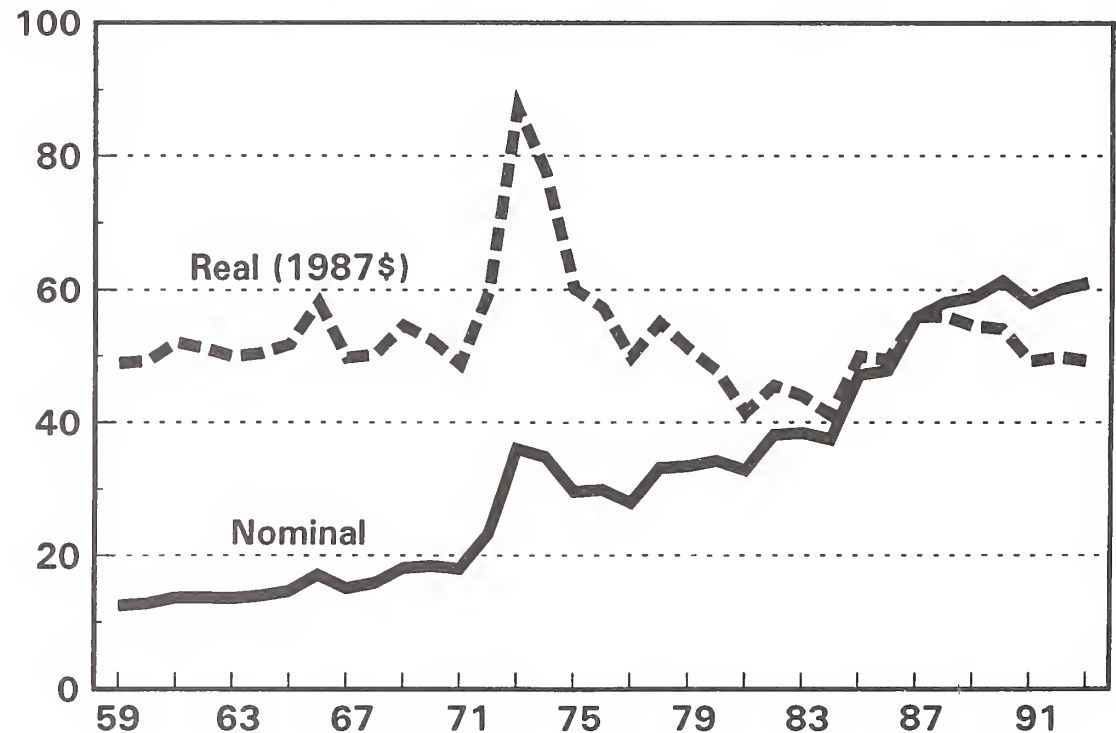
Commercial Farms Enter Decade with Strength

Percent



Real Net Cash Income Steady, Rising Nominally

Billion \$



Outlook '93, Session # 14

For Release: Wednesday, December 2, 1992

FARM FINANCIAL PERFORMANCE: OUTLOOK FOR THE 1990'S

James Ryan and Kenneth Erickson
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Net cash income earned by farm operations in the U.S. is expected to be about \$60 billion in calendar year 1992. This is the second highest level of cash operating income earned by U.S. farm businesses, and forecasts indicate a further increase in net cash income in 1993. The recent high levels of net cash income have generally been attained through higher marketings in an environment of stable costs.

A healthy level of farm income in 1993 is not likely to produce a significant rise in farm sector wealth. In a relatively strong 1993 farm economy, the financial performance outlook is for improved current profitability, but limited farm asset growth, slightly rising debt levels, and marginally higher equity.

Farm business assets, debt, and equity are each expected to rise 0 to 1 percent in 1993. While these moderate increases suggest a stabilizing farm economy, they are projected to lag the general price level rise of 2 to 3 percent. As a result, real (1987\$) asset, debt and equity levels are forecast to decline 1 to 3 percent. At the farm sector level, the slight loss in real wealth is not anticipated to create additional financial stress, as the rise in net cash income should provide farm operators with sufficient income to meet their operating and debt service requirements.

Farms Sector Financially Restructured Since Late 1980's

The high net cash income in 1992 is generated by farm business assets valued at \$846 billion at year-end. The value of farm business assets declined by almost \$260 billion from 1980 through the end of 1986. As a result of gradually rising asset values since then, almost \$122 billion of this nominal decline will be recovered by the end of 1992. Farm business debt fell from \$194 billion in 1984 to \$137 billion by the end of 1990. The slight increases in 1991 and 1992 suggest that farm debt has stabilized at a level that provides for farmers' credit needs without unduly taxing the cash flows of their operations. The overall improvement in the farm sector balance sheet is indicated by the decline of the farm business debt-to-asset ratio from .23 in 1985 to .16 in 1992.

Farm Sector Financial Performance

The farm sector is showing positive signs of recovery, despite the slow decline in real value of farm assets and the gradual erosion of farm equity. Relatively high rates of return on farm equity and assets are expected to continue through 1993. The rate of return on equity from current income is expected to be 3 to 4 percent in 1993.

Other measures of financial performance suggest a stable to modestly improving farm sector during 1993. Farmers are now allocating a smaller portion of their earnings to debt repayment. In 1983, principal and interest payments took 28 percent of gross cash income. With lower debt and more favorable interest rates, only 16 percent of 1993 gross cash income is expected to be needed to meet debt service obligations. After peaking at 23 percent in 1985, the aggregate farm debt-to-asset ratio has stabilized in the 16- to 17-percent range.

Measures of financial performance show continued strength in 1993

Item	1980-84	1985-86	1987-91	1992	1993
Percent					
Profitability					
Return on equity	0.1	1.9	3.5	3.9	3 to 4
Liquidity					
Debt service	27	24	17	16	15 to 17
Solvency					
Debt-to-asset	19.7	22.3	17.1	16.5	16 to 17
Financial efficiency					
Interest-to-gross cash farm income	12.9	10.8	8.0	7.7	7 to 8

Net cash income from farm operations is net cash income before the deduction of interest expenses. This financial indicator measures the net cash income that is being generated by the farm sector, after it meets all non-interest cash production expenditures. It represents the cash income that would be available to the farm sector if it was debt-free and, therefore, interest expense-free. In real terms, this measure has been relatively stable since the early 1950's. The portion of this available cash that was paid as interest to farm creditors rose from less than 16 percent in the early 1970's to almost 37 percent by the end of 1981. With the rapid drop in farm debt levels and interest expenses in the mid-1980's, this ratio fell to less than 20 percent by the end of 1988. It is anticipated to remain in the 17- to 18-percent range through 1993.

Despite the growing net cash income from farm operations generated during the 1980's, farmers found this income depleted by the large proportion of that cash that was paid to creditors in interest payments. These indicators support the view that the economic stress of that period did not result from lower income, but from a changing financial structure that necessitated that a larger income share be distributed to farm lenders.

Farmers Can Repay Additional Debt

Slightly higher interest expenses in 1993 should not dramatically strain the increased net cash available. Despite the gradual erosion of real farm equity, farmers should have adequate net cash income to fully meet their debt repayment obligations.

Farm operators appear to be positioned to profitably use additional credit. In research designed to determine the extent to which farm operators are using their capacity to borrow, studies at ERS suggest that net cash income from farm operations is at a level that could support additional farm debt. Generally, one of the most influential criteria in lenders' evaluations of loan applicants' credit capacity is the amount of borrowers' income that is available for debt repayment. In applying debt coverage ratios to determine credit limits and maximum loan amounts, lenders effectively require that no more than 80 percent of income available for debt repayment be used for loan principal and interest payments. This maximum loan payment is then used to determine the maximum loan that the borrower qualifies for, given the appropriate loan term and the current market interest rate.

Considering net cash income from farm operations as an appropriate proxy for income available for debt repayment, ERS research has analyzed farm operators' use of their debt repayment capacity since 1970. Applying a debt coverage ratio to net cash income from farm operations for each year, the maximum principal and interest payment was determined. The maximum debt that could be serviced by this loan payment was estimated at prevailing market interest rates for a 7 year repayment term. This maximum debt can be thought of as the largest line of credit that the farm sector could obtain in a given year. For the actual level of farm assets, a comparison of the actual farm debt-to-asset ratio with the maximum debt-to-asset ratio that could be supported by the available income provides insight into farmers' use of credit capacity.

Results of this research indicate that farm operators rapidly exhausted their debt repayment capacity during the late 1970's. In 1980-1982, the actual debt owed exceeded the amount that operators could service with the income their farms were then producing. While this was partially due to prevailing high interest rates at the time, those farm operators who borrowed to expand found themselves saddled with a critical mass of surplus debt. This problem farm debt worked itself out during the restructuring that took place over the remainder of the 1980's. Incomes in the mid- to late-1980's supported a higher level of debt, but, as land values declined and heavily indebted farmers experienced loan payment problems, lenders were reluctant to extend credit secured by farmland.

Entering the mid-1990's, one of the more positive farm sector economic indicators is derived by comparison of the actual debt-to-asset ratio with the maximum supportable by the current level of net cash income from farm operations. While total farm sector debt is about one-half that which could be repaid from current income, it also appears that debt could rise by about 20 percent without producing an uncomfortably high sector debt-to-asset ratio. This is not to suggest that farmers should again dramatically expand their borrowing activities, but only to indicate that the farm sector appears to have the capability to safely utilize its growing credit reserves.

Restructuring Evident in Long-term Balance Sheet Changes

The real value of farm assets in 1993 is at virtually the same level that it was in 1962. However, during this 31-year period, the inflation-adjusted level of farm debt has increased over 16 percent. Real farm equity has generally trended downward since peaking in 1980. Unchanged asset values, coupled with a higher debt load, suggests that U.S. farming will be operating with higher fixed costs, and, consequently, a less flexible financial structure at the end of 1993 than that existing 31 years earlier.

The relative increase in debt financing is not entirely due to excessive borrowing during the 1970's. In fact, during the decade of the 1970's the growth rate of farm asset values exceeded the rate of growth in debt. At the time, the rise in use of credit was promoted by the collateral based lending policies of farm lenders, who encouraged their farm operator borrowers to gain economies of size in production and improve efficiency through credit-financed expansion. To an extent, the rise in land values and credit use anticipated increases in earnings beyond those that later materialized. As a result, the U.S. farm sector found itself over-invested and over-extended. The farm financial crisis of the mid-1980's was largely a period of balance sheet readjustment, as asset values and debt approached levels justified in terms of the economic returns produced by the farm sector.

The continuing high level of farm earnings in recent years, accompanied by modest nominal increases in asset values and stabilized debt levels, suggest that the recovery from the financial crisis of the mid-1980's is nearing completion. The farm sector entering 1993 is more cost-efficient, better capitalized, and positioned for improved potential profitability.

While 1993 forecasts are generally optimistic, the farm sector is approaching the new year with caution, as uncertainty relates both to world commodity markets and to the sustainability of an anticipated 1993 increase in government payments.

Domestic macroeconomic policy and the performance of the U.S. economy will continue to be a major influence on the farm sector. Forecasts of general economic conditions suggest that real domestic GDP growth will rise from less than 2 percent in 1992 to almost 3 percent in 1993. Internationally, agricultural commodities are becoming more visible in trade negotiations. U.S. food aid to developing nations and assistance to former USSR and Eastern European countries may impact domestic commodity prices and inventory levels.

Generally, an increase in the level of assistance above current projections would have a positive influence on the U.S. farm sector.

These global and domestic uncertainties, coupled with other projected financial performance measures, suggest that the farm economy will experience only a moderate rate of growth in 1993, despite the relatively high level of net cash income.

Farm Asset Values to Increase Slightly

The value of U.S. farm business assets rose less than \$5 billion during 1992, an increase of 0.5 percent. Total assets are forecast to rise to a range of \$845 to \$855 billion in 1993, as the growth rate in asset values continues in the 0- to 1-percent range. These sustained moderate increases in asset values may reflect a long-run stabilization of the agricultural economy. The real value of farm assets is projected to decline both in 1992 and in 1993, as the general rate of inflation is anticipated to exceed the growth in asset values.

The value of farm real estate assets is expected to be unchanged during 1992. The stable total farmland value suggests that relatively high cash income levels, even in the presence of favorable interest rates, have not dramatically increased farmers' desire to bid up land prices in attempting to expand operations. Land value appreciation in 1993 is expected to be less than 1 percent.

Farm balance sheet in 1993 shows slight improvement in nominal terms, slight decline in real terms

Item	1988	1989	1990	1991	1992	1993
Current dollars						
Assets	800.9	828.9	846.5	841.8	846	845 to 855
Debt	139.4	137.2	136.8	138.8	140	138 to 144
Equity	661.5	691.7	709.7	703.0	707	705 to 715
Deflated dollars (1987 \$)						
Assets	770.8	764.0	747.8	714.6	705	685 to 695
Debt	134.2	126.5	120.8	117.8	116	111 to 117
Equity	636.7	637.5	626.9	596.8	588	570 to 580

Nonreal estate asset values are forecast to rise by almost \$5 billion in 1993, matching 1992's gain. Livestock inventories are expected to account for about 20 percent of this increase, as rising cattle inventories should more than offset an expected decline in year-end prices. Cattle account for over 90 percent of the value of all year-end livestock inventories. Hog inventory values are expected to decline slightly, due principally to anticipated lower prices. The value of machinery on farms is expected to fall slightly in 1993, while farm business financial assets are projected to increase. The inventory value of stored crops is anticipated to trend steady to slightly lower, while the value of purchased inputs inventories is forecast to increase modestly.

Farm Debt Up in 1993

Total farm debt is anticipated to increase 1 to 2 percent during 1993. While debt is projected to rise less than 1 percent in 1992, such an increase would mark the second consecutive year of increased farm indebtedness. The slight rise in debt in 1991 had ended a 6-year run of annual debt reductions. Stable land values and healthy cash income of farm borrowers are easing lenders' concern with loan defaults arising from land value declines.

Farm credit markets appear to have completed the evolution from the collateral based lending of the late 1970's and early 1980's. Operating in a more vigilant regulatory environment, lenders have placed greater emphasis on the borrower's ability to repay loans from current income. While farmers and lenders are relying more on overall repayment ability as the main criteria in credit decisions, they are also examining more closely the profitability of individual credit-financed investment projects. In this more cautious financial environment, farmers and their lenders continue to show restraint in incurring debt to purchase land and replace machinery and equipment.

While total farm business debt is forecast to increase slightly during 1993, the loan portfolios of individual lenders may change dramatically. The traditional institutional farm lenders, the Farm Credit System (FCS) and commercial banks, are regaining their financial health as the recovery continues.

FCS institutions reported higher earnings in the third quarter of 1992, due mainly to an improved net interest margin. The higher margin resulted from the normal refinancing of maturing debt, as previously issued higher-cost debt was replaced with lower-cost debt. FCS is also benefitting from improved loan portfolio quality. While its member institutions continue to recruit quality borrowers, total FCS lending should increase only slightly in 1993. An increase in FCS nonreal estate lending is expected offset a decline in real estate loans. FCS is expected to hold 25 percent of all farm debt at the end of 1993.

Commercial bank lending should rise by nearly \$2 billion in 1993, as banks report adequate credit availability for qualified borrowers. Rural banks appear to be in sound financial condition, with most reporting lower than desirable loan-to-deposit ratios. Banks are expected to continue to gain

market share in both real estate and nonreal estate lending. By year-end 1993, banks are anticipated to hold over 38 percent of all farm debt.

As FmHA continues to resolve its problem loan portfolio, FmHA farm debt could fall by another \$1.5 to \$3 billion in 1993. On September 30, 1992, over 42 percent of FmHA farmer program debt was owed by delinquent borrowers. Delinquent principal and interest payments totalled over \$4.8 billion. Future FmHA direct lending activities will be affected by implementation of HR 6129, the beginning farmer bill, which is currently awaiting presidential signature. The bill would assist beginning farmers, but it would also limit borrowers to 10 years of FmHA direct loans, and 15 years of combined FmHA direct and guaranteed loans.

To a large extent, farm lenders were reluctant partners in the resolution of the financial crisis of the 1980's. Farm business debt fell from \$193 billion at the beginning of 1985 to an estimated \$137 billion at year-end 1991, a drop of \$56 billion. Over \$21 billion of this decline can be attributed to loan charge-offs taken by lenders during this period. During the recovery since the late 1980's, loan loss rates for all lenders other than FmHA have declined substantially. The improved quality of most lenders loan portfolios suggests that a recurrence of a large volume of problem loans is not likely in the near future.

Conclusions: Farm Sector Recovery Slow, But Steady

While most financial performance measures point to an improved farm economy, all is not positive for the sector in 1993. As the rest of the economy sluggishly recovers from recession, the cash income gains of 1993 will be heavily dependent on rising government payments. Some farmers will make financial progress in 1993, and will be able to avoid major set-backs.

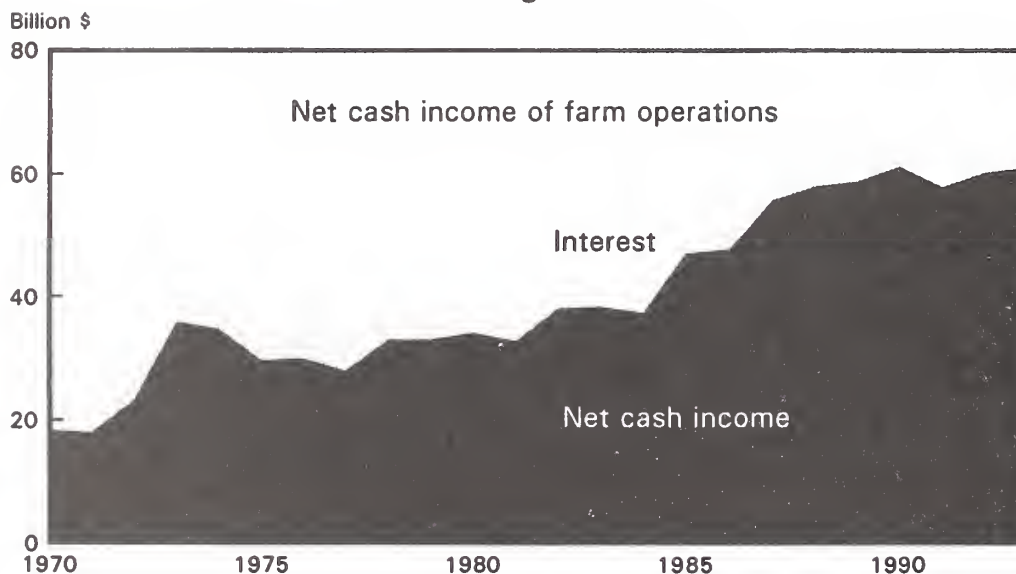
Overall, the financial position of farmers entering 1993 appears to be gradually improving from the depths attained in the mid 1980's. While the combined effect of gradually increasing asset values and reduced debt loads have greatly lowered farmers' vulnerability to short-term fluctuations in income, the prospect of long term declining real equity values reduces the investment appeal of agricultural land.

As the globalization of world markets further unfolds in the 1990's, politically resolved trade and assistance issues may significantly change economic relationships. The market conditions emerging from trade reform and agreements can be expected to greatly affect the sector's financial performance and well-being.

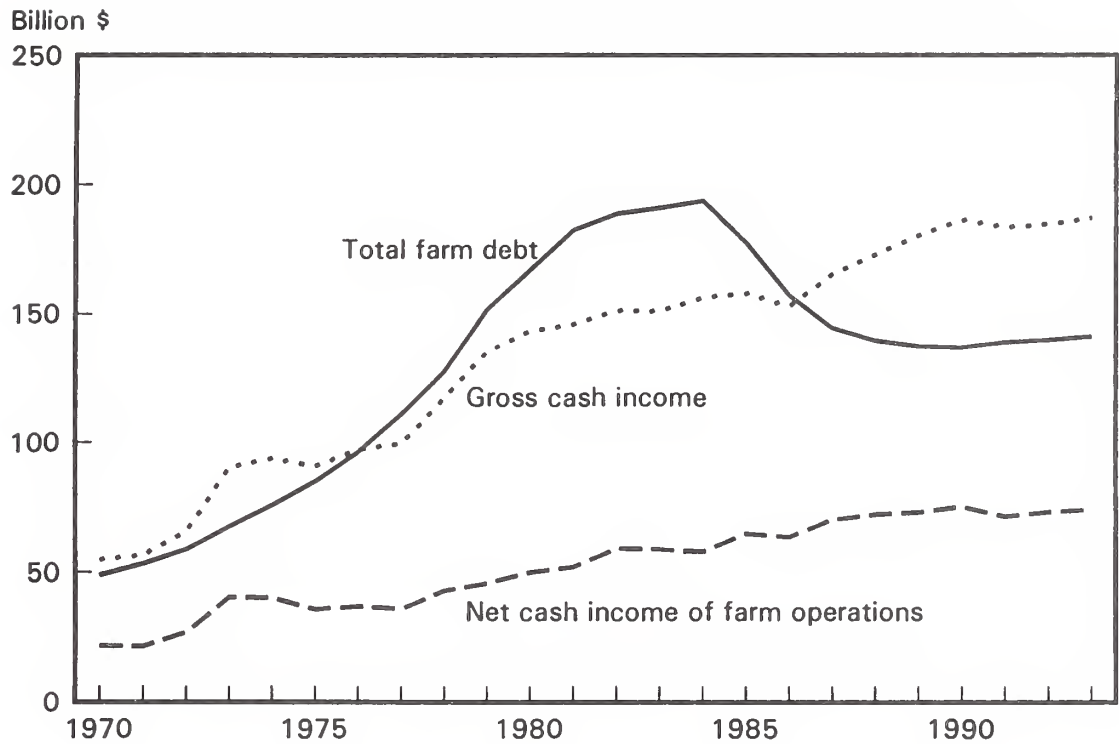
Measures of Financial Performance

	1980-84	1985-86	1987-91	1992	1993
	Percent				
Profitability					
Return on equity	0.1	1.9	3.5	3.9	3 - 4
Liquidity					
Debt service	27	24	17	16	15 - 17
Solvency					
Debt/asset	19.7	22.3	17.1	16.5	16 - 17
Financial efficiency					
Interest/gross cash farm income	12.9	10.8	8.0	7.7	7 - 8

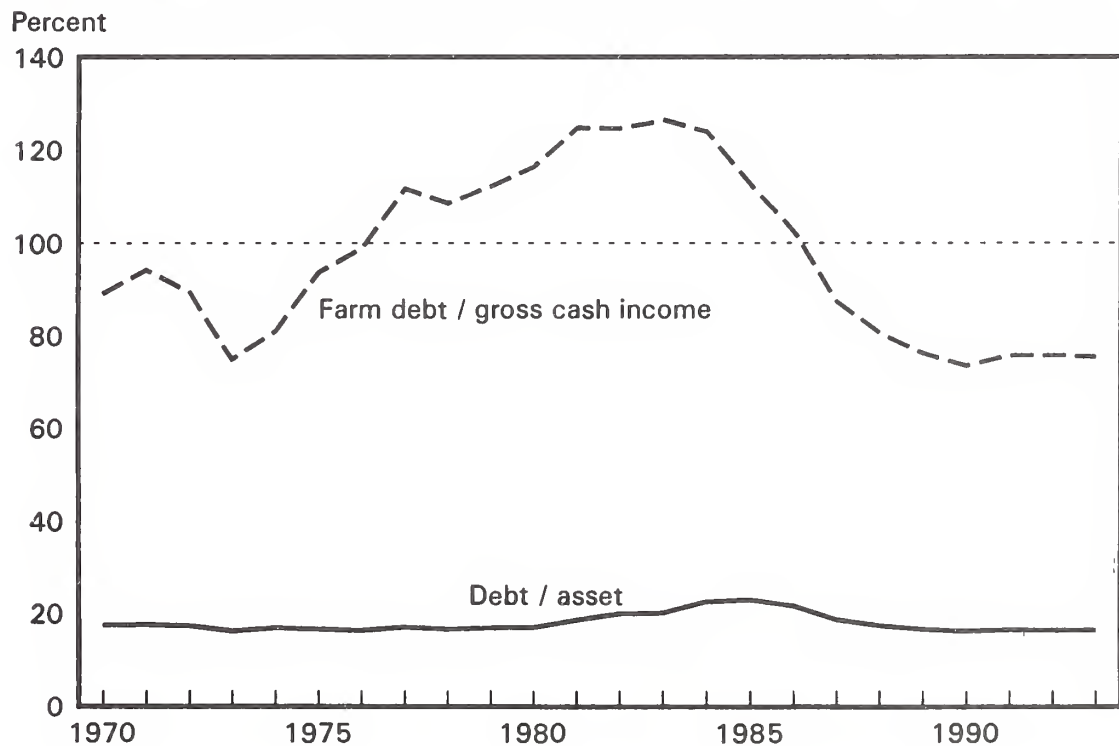
Net cash income of farm operations rose during the 1980's, but interest payments took a larger share



When farm debt exceeds gross cash income farmers face potential loan repayment problems



The debt / gross cash income ratio indicates farmers' loan repayment problems better than the debt / asset ratio



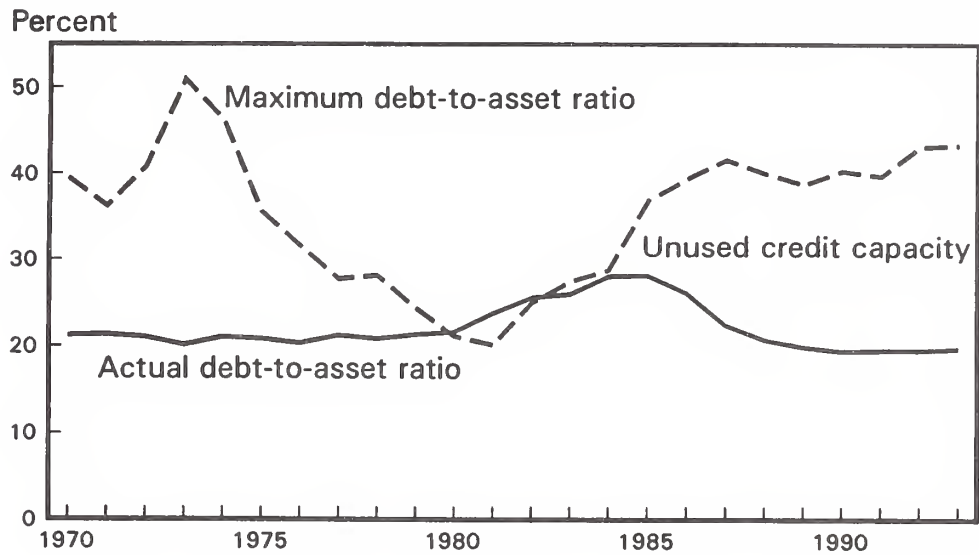
Balance sheet changes

	1992	1993
	Percent	
Assets	1.3	0 to 1
Real estate	0.0	0 to 1
Nonreal estate	2.2	0 to 2
Debt	0.9	0 to 1
Equity	1.1	0 to 1
GDP implicit price deflator	2.6	2 to 3

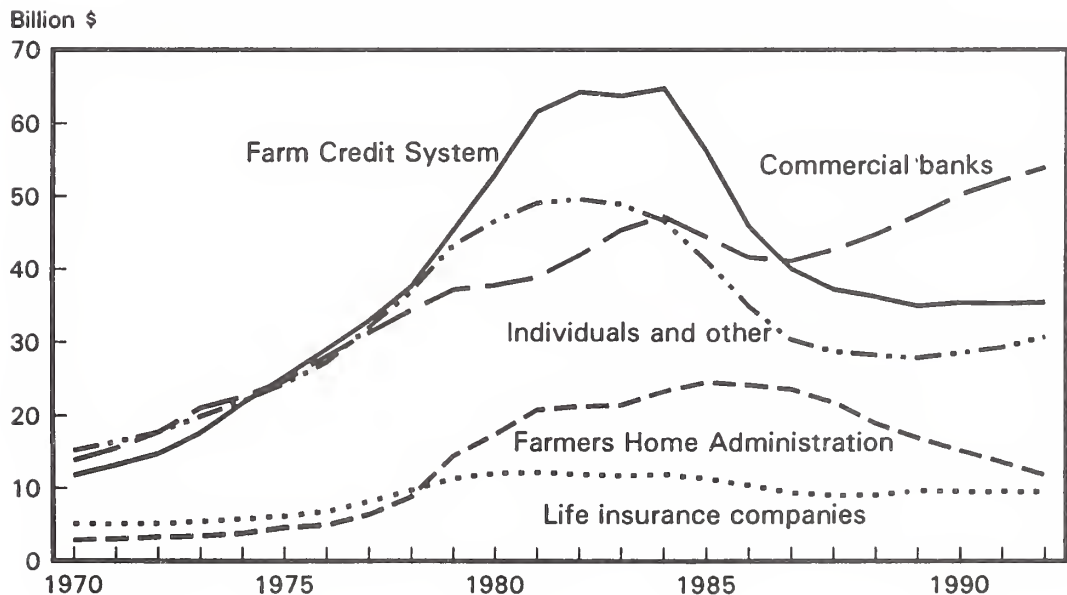
Farm balance sheet in 1993 shows slight improvement in nominal terms, slight decline in real terms

	1988	1989	1990	1991	1992	1993
	Billion dollars					
Current dollars						
Assets	800.9	828.9	846.5	841.8	846	845 - 850
Debt	139.4	137.2	136.8	138.8	140	138 - 144
Equity	661.5	691.7	709.7	703.0	707	705 - 715
Deflated dollars (1987 \$)						
Assets	770.8	764.0	747.8	714.6	705	685 - 695
Debt	134.2	126.5	120.8	117.8	116	111 - 117
Equity	636.7	637.5	626.9	596.8	588	570 - 580

**Farm operators exhausted their credit capacity
in the 1970's--they can repay additional debt now**



**While total debt is relatively stable,
the distribution among farm lenders will continue
shift--bank lending could increase \$2 billion in 1993**



Outlook '93

For Release: Wednesday, December 2, 1992

OUTLOOK FOR PRODUCTION INPUTS

Harold H. Taylor and Marlow Vesterby
Agricultural Economists
Economic Research Service

The outlook for farm inputs consumption and expenditure in 1993 will be influenced by energy prices, an expected decrease in row crop acreage, and an anticipated increase in solid seeded crop acreage next year. Farmers are expected to spend between \$144 and \$148 billion in 1993 for agricultural inputs, representing a 1 to 2 percent increase from the estimated 1992 level. Planted acreage of the major crops in 1993 may be slightly less than 1992 levels which would likely reduce the use of most crop inputs. However, aggregate input expenses likely will remain stable or increase slightly due to higher manufactured input costs.

Planted Acreage

Input use on crops is highly dependent on the mix and level of crop acres planted. Per acre seeding rates, application rates for fertilizer and pesticides, and tillage practices tend to change slowly from year-to-year, leaving acres planted as the major short-run determinant of aggregate consumption.

Planted acreage of the principal row and solid seeded crops peaked in 1981, fell dramatically in the PIK-year of 1983, bounced back in 1984 and declined through 1988¹. During 1989 to 1992, planted acreage was 3-5 percent above 1988 levels. Much of the planted acreage variation in the 1980's was due to input intensive row crops. The less intensively farmed small grains crop acreage, which is dominated by winter wheat, declined between 1982² and 1988 but increased 6 million acres between 1988 and 1990. Planted acreage of solid seeded crops declined again

¹Principal row crops include planted area of corn, sorghum, soybeans, flaxseed, peanuts, sunflowers, cotton, dry edible beans, potatoes, sweet potatoes, and sugarbeets; and harvested area of tobacco and sugarcane. Principal solid seeded crops include planted area of oats, barley, durum and other spring wheat, rice, winter wheat, and rye. All hay area is for harvested acreage only.

in 1991-92. Planted acreage of the principal crops in 1992 was about 328 million acres and is expected to be down by about 2 million in 1993.

The mix of crops in 1993 is likely to shift due to different Acreage Reduction Program (ARP) levels and increased flexibility of farm programs. There will likely be a decrease in row crop acreage, especially corn, due to the corn ARP increase from 5 percent in 1992 to 10 percent in 1993. An increase in solid seeded crop acreage will probably occur because of the decrease in wheat ARP acres from 5 percent in 1992 to 0 percent in 1993. Oats and barley also have zero ARP's for 1993.

Seed Consumption

In 1992, seed consumption of the eight² major field crops was close to 6.0 million tons, down 17 percent from the record year of 1981 when 7.2 million tons were planted. Seed use on corn, sorghum, wheat, and rice were up in 1992 while barley and cotton seed use were lower than 1991. Soybean seed use remained about the same. For 1993, seed use is expected to increase 1 to 2 percent since the increase in seed demand for wheat, soybeans, oats, and barley will more than offset the expected decline in seed demand for planted acreage of corn, sorghum, and cotton.

Higher corn, grain sorghum, small grains, and cotton seed prices in 1992 were offset by generally lower seed potato, soybeans, and most of the forage seed prices. As a result, USDA's prices paid index for seed was 1 percent lower than the previous year. Adequate seed supplies, a modest increase in seed demand, and small commodity price movements should keep the seed price index increase to less than 1 percent in 1993. Seed prices, especially for non-hybrid crops, tends to follow commercial crop prices and with the exception of wheat and oats, commodity prices in 1993 are forecast to fall below 1992 levels.

Fertilizer Consumption

Estimated fertilizer nutrient consumption of about 20.9 million tons for the 1992 fertilizer year is 3 percent more than the 1991 consumption of 20.3 million tons. Fertilizer use in 1993 should be near 20.2 million tons, if expected reductions in row crop acreage, especially corn, is realized.

The 1992 application rate survey for wheat indicates that the share of acres treated with N and P were more than in 1991, but

²The eight major field crops for seed consumption include barley, corn, cotton, grain sorghum, oats, rice, soybeans, and wheat.

less for k. Application rates were slightly higher for nitrogen, but less for phosphate and potash. In the case of corn, the major consumer of fertilizer nutrients, per acre application rates for nitrogen, phosphate and potash were less than 1991 levels. Percent of acres treated were the same or less than 1991.

U.S. fertilizer prices declined sharply in 1992. Reduced world demand, as a direct result of the economic reforms in Eastern Europe and the former USSR, and burdensome U.S. stocks due to less than anticipated increases in U.S. planted acreage put downward pressure on prices. Despite modest decreases in demand projected for 1993, prices will likely be up slightly in 1993, due to the recent surge in natural gas prices. The sharp rise in anhydrous ammonia prices during the latter half of this year signals a return to the more nominal price levels experienced in 1991.

Pesticide Use

Estimates for pesticide use on the 10 major field crops also closely follow planted acreage with herbicides accounting for an estimated 84 percent of all active ingredients, insecticides about 14 percent, and fungicides and other compounds the remainder.³ The herbicide market for the major crops of corn, cotton and soybeans is very mature with over 90 percent of the corn, soybean, and cotton acreage treated with herbicides, since the late 1970's. In recent years, over 95 percent of the corn and soybeans acres were treated with herbicides.

Application of pesticides on the major field crops is estimated at around 450-500 million pounds of active ingredients (a.i.) with year-to-year variations due to shifts in planted acreage and pest infestations. Since corn, soybeans, wheat and cotton account for the largest portion of pesticide use, changes in these crop acres will significantly affect aggregate pesticide use. With 1993 wheat and soybean acreage expected up and corn and cotton acreage down, pesticide consumption is expected to decrease 3 percent from 1992 levels. As new products, which require very small amounts of a.i. per acre, are more widely adopted, aggregate pesticide poundage may actually decline even though acres treated remain stable or even increase.

Pesticides prices, as measured by USDA's prices paid index for agricultural chemicals, trended downward between 1984 and 1987 but the trend has reversed with the index increasing 25 percent between 1988 and 1992. Despite fewer planted acres in 1993, pesticide prices will likely increase 4 to 6 percent. Petroleum

³The 10 major field crops are wheat, barley, oats, rice, corn, cotton, grain sorghum, peanuts, soybeans, and tobacco.

feedstock price increases, pesticide manufacturers increased expenditures for research and development of new products, and additional costs for reregistering older products are reflected in pesticide prices paid by farmers.

Capital Purchases

Repairs and depreciation on tractors, farm machinery and other capital equipment and buildings on farms accounted for around 18 percent of all farm production expenses the last five years. In 1991, capital purchases and repairs totaled \$25 billion for the farm sector.

Tractor purchases by farmers had been in a seven year decline through 1986. Since that time tractors made a steady recovery through 1990, but declined in 1991 and are forecast to be down again in 1992. Unit sales, at 119,000 in 1980, declined to 47,000 in 1986. Sales rose to 66,000 in 1990, and are forecast at 53,000 units in 1992. Purchases decreased proportionately more for larger tractors and combines. Combine purchases for the first 9 months of 1992 were 33 percent below those of the corresponding months of 1991.

The downturn in 1992 occurred despite lower interest rates, higher farm assets, and lower debt/asset ratios, factors normally associated with increased capital purchases. However, capital purchases for both 1991 and 1992 were below 1990 levels. The economic slowdown and its effect on farmer expectations about future commodity prices and farm incomes likely has been a major factor in decreased farm machinery investment since 1990. Also, farmers recall the financial distress experienced in the farm sector during the 1980s caused by increasing debt and decreasing assets. Many farmers are reluctant to incur higher debt to avoid a return to a farm financial crisis like that of the 1980s. Lenders have also tightened credit requirements.

Increased conservation practices are also affecting purchases of farm machinery and fuel. To comply with 1995 USDA requirements for farm plans to conserve highly erodible soil, farmers are adopting various conservation tillage measures, such as no-till, mulch-till, and ridge-till, all of which require fewer tillage operations, and consequently, less hours of use for tractors and machinery. Decreased hours of use translate into fewer purchases of equipment and less fuel consumption. Furthermore, there is not likely to be a trend back to moldboard plows and conventional tillage.

Accompanying the trend in reduced tillage is a trend toward larger, more durable tractors and machinery. Larger equipment will cover the same acreage in less time. More durable equipment lasts longer. These factors tend to increase the optimal

replacement age of tractors and equipment, or in economic jargon, lengthen the real depreciation schedule.

However, it is anticipated that in 1993 demand factors favoring increased capital equipment purchases will outweigh those depressing demand. For 1993, a slight increase in tractor purchases is anticipated. Several factors should work together to bring about the increase. Farm income in 1992 is forecast up from 1991. Machinery purchases tend to lag farm income, a positive factor for 1993. The value of farm assets will probably continue to increase in 1993 and the debt asset ratio should hold steady at about 14-15. The capital stock of farm machinery on farms is aging and increased replacement will likely occur as farmers find it more efficient to buy new rather than repairing old machinery. Interest rates for farm equipment loans are the lowest they have been since 1962, another positive factor toward increased purchases. And even though farmers are adopting more reduced tillage practices, many of these practices require special equipment, such as heavier drills and special ridge-till cultivators, which implies a continued trend away from moldboard plows to the newer reduced tillage equipment. Combine purchases are expected to level off at about the forecast 1992 figure of 7,700 units, ending three years of successive declines in purchases.

Tractor, truck and machinery prices have risen nearly every year since 1980. From 1980 to 1992, prices of farm trucks and autos have more than doubled. Price increases will likely continue through 1993, probably in the range of 3 to 5 percent.

Table 1--Prices paid for trucks, tractors, and other farm machinery

Year	Trucks and autos	Tractors and self-propelled machinery	Other machinery
1977 = 100			
1982	159	165	160
1983	170	174	171
1984	182	181	180
1985	193	178	183
1986	198	174	182
1987	208	174	185
1988	215	181	197
1989	223	193	208
1990	231	202	216
1991	244	211	226
1992 July	262	217	234

Source: National Agricultural Statistics Service, USDA.

Petroleum Products

Consumption of petroleum products by agricultural producers declined 21 percent from 1985 to 1989. From 1990 through 1992, consumption has been stable at about 4.8 billion gallons. Energy use for 1993 is forecast to decline about 50 million gallons from 1992, based on forecasts of fewer planted acres next year.

World crude oil prices heavily influence the prices farmers pay for refined petroleum products. Petroleum prices dropped almost continuously between 1982 and 1986. Petroleum prices and crude oil prices were relatively stable between 1986 and 1989, rose during the Middle-East crisis, and decreased in 1991 and 1992. The Department of Energy is forecasting 1993 imported crude oil price increases of 6.6 percent from 1992 levels, while the 1993 diesel fuel price is forecast to increase by about 5 percent. Since agriculture directly consumes only 3-4 percent of all energy used in the United States, changes in the farm sector's usage will have little impact on petroleum prices.

In addition to increased use of reduced tillage, other factors are affecting the decline in fuel use. The switch from gasoline to diesel engines, larger multi-function machines, and innovations in crop drying and irrigation have contributed to the long-run decline in fuel consumption.

Table 2--Fertilizer use on selected crops in the major producing States, 1992 (preliminary)

		Acres receiving			Application rate					Acres receiving			Application rate		
State	Acres 1/	N	P2O5	K2O	N	P2O5	K2O	State	Acres 1/	N	P2O5	K2O	N	P2O5	K2O
Thousand		Percent			Pounds per acre			Thousand		Percent			Pounds per acre		
Corn for grain								All wheat 2/							
IL	11,200	99	85	84	155	77	105	AR	900	100	36	36	101	44	58
IN	6,100	97	89	84	143	66	107	CO	2,300	63	15	6	39	16	10
IA	13,400	96	77	73	118	57	69	ID	800	91	51	7	93	35	28
MI	2,700	96	89	85	119	52	87	IL	1,100	98	86	71	86	73	85
MN	7,200	97	87	84	110	48	64	IN	450	98	83	81	88	62	67
MO	2,450	96	75	77	138	52	70	KS	10,900	87	50	8	58	33	32
NE	8,300	98	73	29	136	37	19	MN	2,800	96	90	66	86	34	39
D1 3/	2,706	95	56	25	94	41	19	MO	1,350	96	82	82	77	49	54
D2 4/	5,594	99	81	30	155	35	19	MT	4,900	68	62	13	32	24	16
OH	3,800	100	92	88	149	69	96	NE	1,950	77	38	7	47	29	13
SD	3,800	84	72	29	78	38	19	ND	11,400	83	73	15	55	28	14
WI	3,900	99	95	95	86	44	62	OH	1,140	100	94	91	89	63	65
10 State								OK	6,000	94	46	8	73	33	21
Total	62,850	97	82	72	127	57	79	OR	850	97	19	10	63	34	25
								SD	3,900	65	54	4	42	26	14
								TX	3,800	69	31	6	77	41	14
								WA	2,000	97	40	7	75	28	17
								14 State							
								Total	56,540	83	56	18	63	34	39

1/ Acres are harvested for winter wheat and planted for all other crops.

2/ Does not include winter wheat in MN, ND and SD; spring wheat in CO and WA; and durum wheat in MN, MT, and SD.

3/ Non-irrigated.

4/ Irrigated.

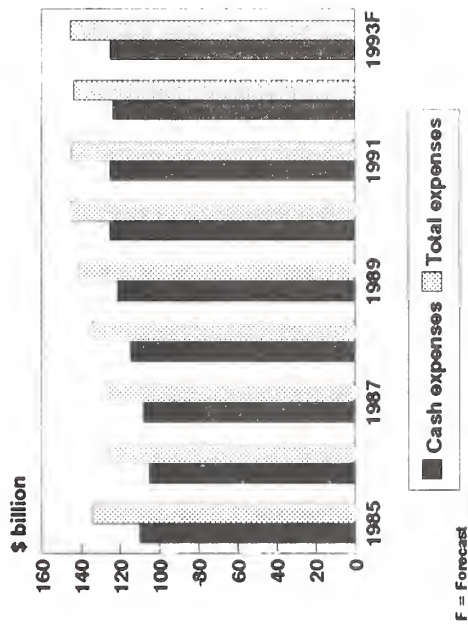
Table 3--Seeding rates, and seed cost per acre, 1992 (preliminary)

States	Acres Planted	Rate Per acre	Cost per acre	State	Acres Planted	Rate per acre	Cost per acre
Corn for grain				Spring wheat			
	Thousand	Kernel	Dollars		Thousand	Pounds	Dollars
IL	11,200	25,628	21.51	MN	2,800	110	10.67
IN	6,100	25,041	19.71	MT	2,650	64	6.35
IA	13,400	25,790	21.86	ND	9,200	93	7.78
MI	2,700	24,802	20.06	SD	2,700	92	7.59
MN	7,200	27,175	23.76				
MO	2,450	22,567	19.52	4 State	17,350	91	8.39
NE	8,300	25,124	21.95	Total			
D1 1/	2,706	19,275	16.39				
D2 2/	5,594	27,953	24.64				
OH	3,800	26,399	22.68	Durum wheat			
SD	3,800	20,019	17.56		Thousand	Pounds	Dollars
WI	3,900	26,194	20.40				
10 State				ND	2,200	96	7.56
Total	62,850	25,304	21.35				

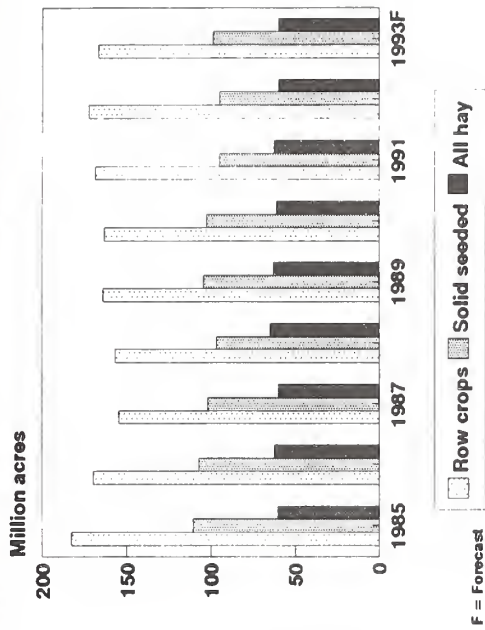
1/ Non-irrigated.

2/ Irrigated.

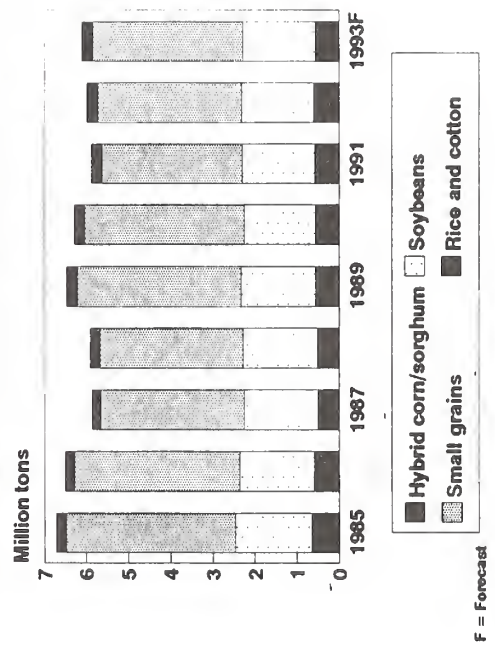
Farm Expenses



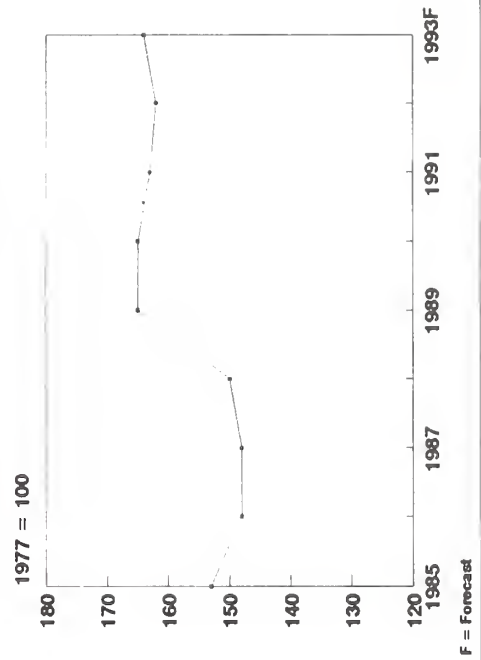
Area Planted to Principal Crops



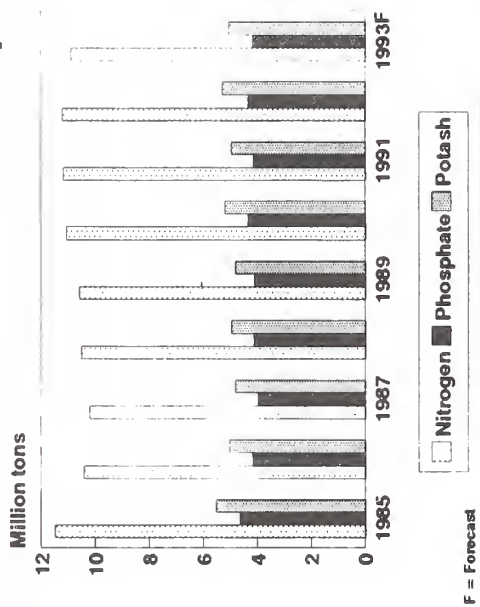
Seed Use for Major Crops



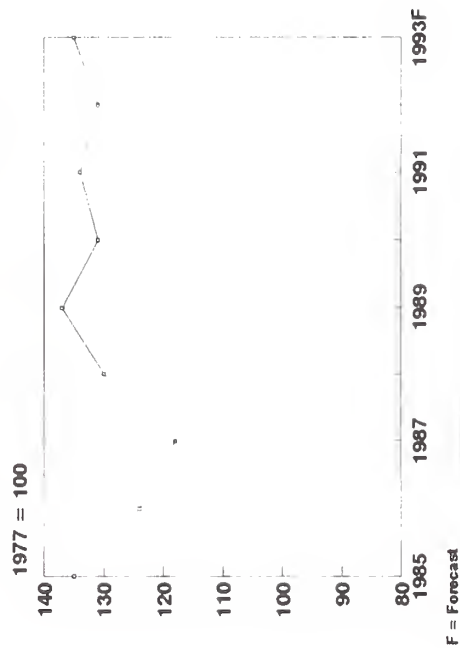
Seed Price Index



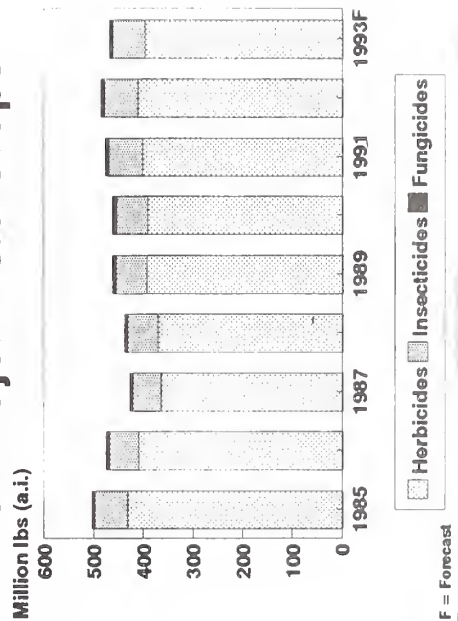
Fertilizer Nutrient Consumption



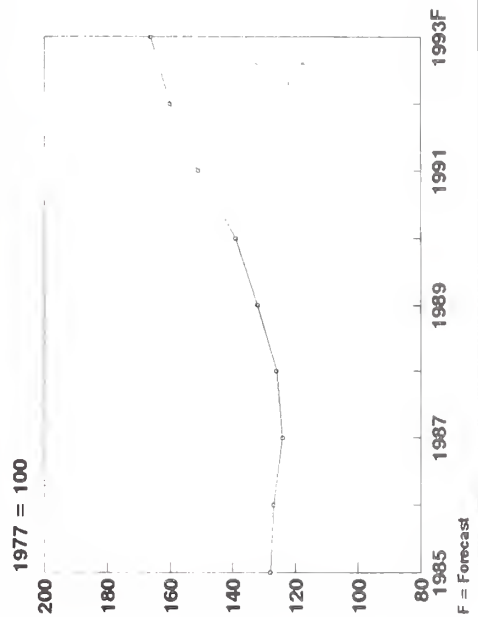
Fertilizer Price Index



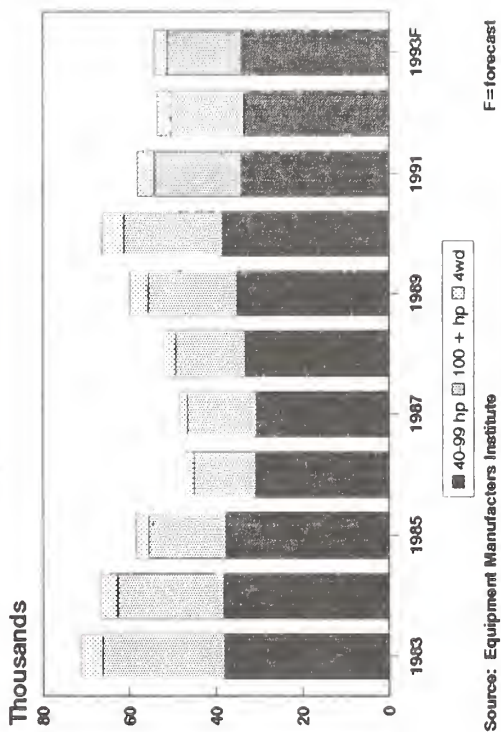
Estimated Pesticide Use on Major Field Crops



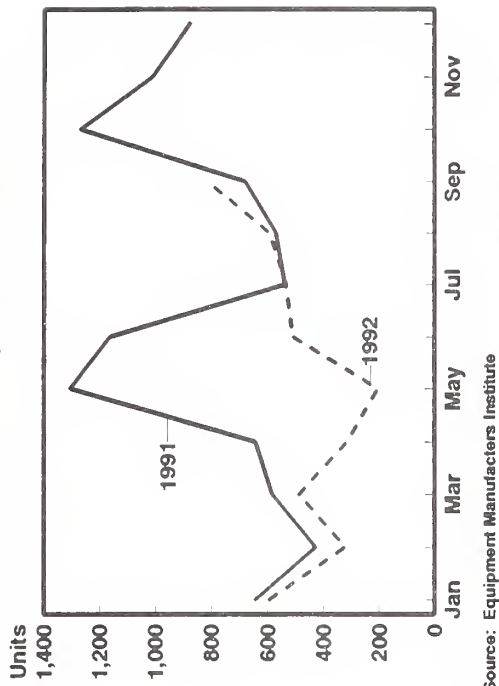
Agricultural Chemical Price Index



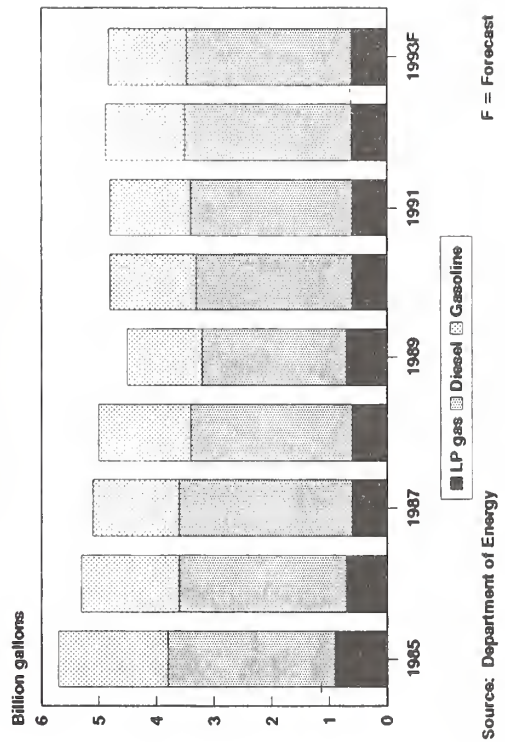
Tractor Unit Sales



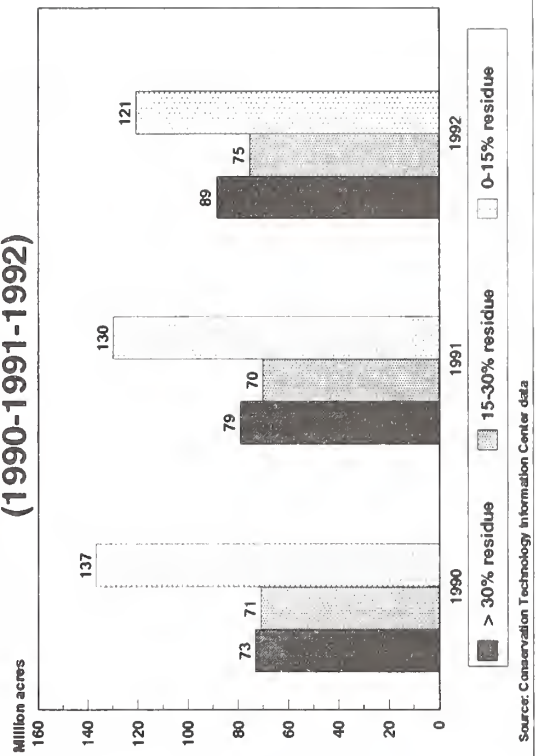
Sales of Self-Propelled Combines



Farm Fuel Use



Tillage Practices on Acres Planted (1990-1991-1992)



Outlook '93

For Release: Wednesday, December 2, 1992

AGRICULTURAL LENDING INTO THE 21ST CENTURY

Marvin Duncan
Professor and Chairman
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This paper proposes and discusses a scenario for agricultural lending throughout this decade and into the next. Agricultural lending has been a unique subdiscipline of the credit business since soon after the founding of the Republic. Indeed Thomas Jefferson's and Alexander Hamilton's great debate over disposition of the Northwest Territory went to the core of whether a nation of citizen farmers owning and farming their own property was preferable to large land holdings in the hands of absentee landowners.

Hamilton said sell to the highest bidder for cash and in large tracts. Jefferson held out for sale in tracts farm families could own and for reasonable accommodation on financing those sales. Hamilton lost the argument; Jefferson won, and the world's first modern republic of citizen farmers was born.

That concept has guided the settlement of this country and its public policy toward agriculture. As a result, a distinctive system of specialized credit for agriculture developed. Specialized analysis of those needs and a responsive public policy system continues today.

But the economic landscape of both rural America and farming is rapidly changing in response to internationalization of markets and urbanization of economic activity in this country. The nation's agricultural sector and institutions serving that sector are no longer as unique or separate as they once were. In many respects, the application of new technology change by the sector producers, input suppliers, and processors seems to be irretrievably melding the sector into the broader landscape of U.S. economic activity. These changes appear to have picked up tempo in the last three decades. No one reasonably expects a reversal of trend, though some may wish that could occur.

Consequently, farmers and their lenders reflect on the future of agricultural lending, the products and services it brings to the market, and, indeed, on the changing structure of the U.S. agricultural sector. This paper discusses one scenario of the future. Of course other scenarios are possible. The scenario discussed is, I believe, plausible in the context of the evidence presented.

The outlook for agricultural lending is conditioned by the likely performance of the broader U.S. economy. That performance has important implications for agricultural producers. The implications for lenders are motivated by both changes in their customer base and in the functioning of the lending business.

Lenders' Outlook Is Function of Broader Economic Environment

The agricultural outlook is increasing conditioned by and is a function of the broader economic environment. For a number of reasons, the United States is experiencing the weakest economic performance in recovery in post-World War II memory (Figure 1). Those who argue the recession has not ended are wrong. But this mistake is understandable. GNP growth in the first six quarter of expansion has fallen far behind the average of the past eight recoveries. Even into the second year of recovery, the expansion is still little more than half as strong as typical. Indeed compared to the post-World War II average, this recovery has been only one-third as robust.

Figure 1.
GNP GROWTH AFTER RECESSION

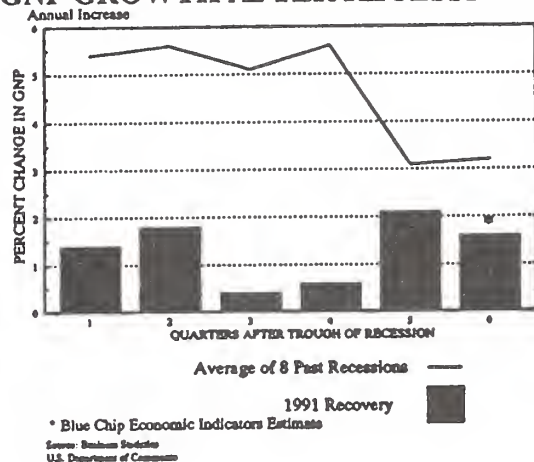
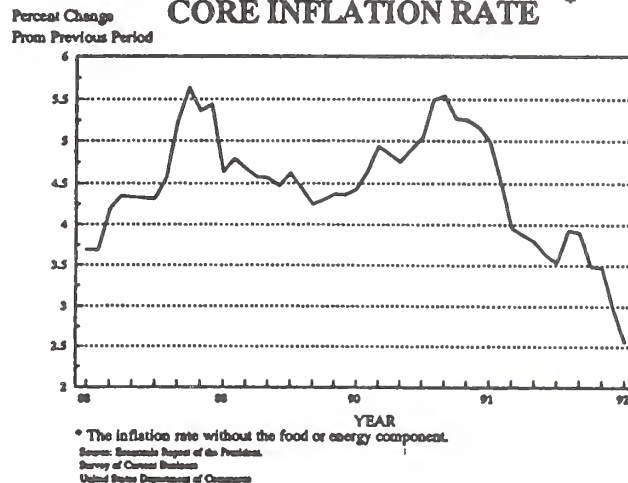


Figure 2.
**UNITED STATES
CORE INFLATION RATE ***



A number of reasons for this anemic performance should be noted. First, unemployment--the highest in a decade--continues to be a drag on consumer confidence. The fundamental restructuring of our economy to ready it for world competition has resulted in widespread downsizing in business firms affecting both production and white collar workers. The fear of job loss along with a recognition that such jobs may be gone forever has shaken consumer confidence in the economy; the consumer confidence index currently is at about half the level of the 1980s.

High levels of public and private debt have limited the capacity of consumers and business firms to spend. Indeed, primary attention has been focused on reliquifying both households and business firms. On the bright side, once that is accomplished, the stage may be set for a prolonged expansion.

Limiting economic growth, as well, is the current growth of productivity in the United States. Growing about half as fast in the 1980s as in the 1950-70 period, this has limited the economy's capacity for noninflationary growth. On the positive side, the United States now enjoys the world's highest worker productivity in manufacturing. On balance, U.S. economic growth during the 1990s is not apt to equal the remarkable pace of the post-World War II period.

Price inflation seems likely to be held under tight control. The nation's core inflation rate has fallen to the range of 2 to 2.5 percent during this year (Figure 2). Indeed, the core rate of inflation has declined in three of the past five months. To many analysts, that comes very close to representing effective price stability. Food price inflation, up only about 1 percent this year, will further restrain the rise in the Consumer Price Index. Slow money growth, near the bottom of the Federal Reserve's range for M2, will also restrain inflation.

Agricultural export sales, critically important to the rate of capacity utilization in the American agricultural plant, will probably grow only slowly (Figure 3). The experience of the 1980s was that substantial government support in the form of GSM credit and Export Enhancement activity was needed to hold exports at about \$40 billion. In real dollars, exports are slightly less than twice as large today as in 1960. For a number of reasons, strong growth in export tonnage also may be difficult to achieve in the 1990s. The United States will likely focus its effort on adding more value to that tonnage in order to sustain export sales growth.

Figure 3.
UNITED STATES AGRICULTURAL EXPORTS

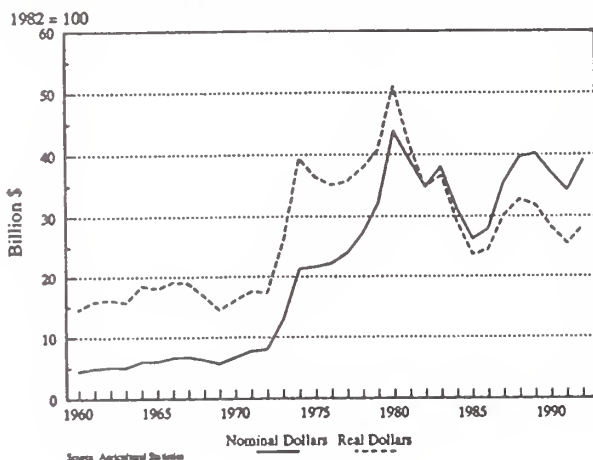
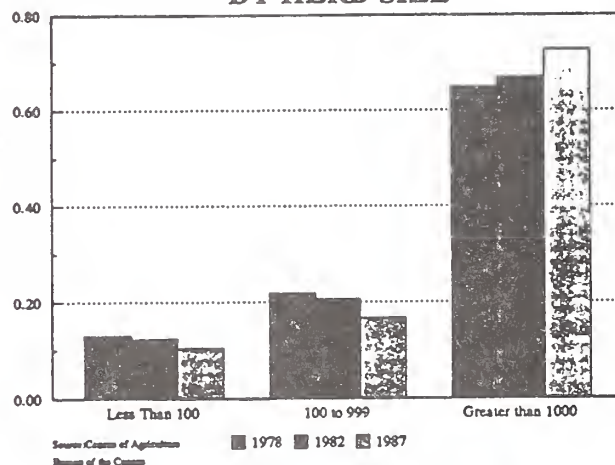


Figure 4.
PERCENTAGE OF FAT CATTLE SOLD
BY HERD SIZE



Technology will support greater specialization, increased scale of production, and more vertical integration. Agriculture is not unaffected by the increased capacity to use information, control the production environment, and add output through use of production-enhancing technology that is so dramatically changing the face of American manufacturing and service businesses. Many of these technologies have application in agriculture and their adoption domestically is spurred further by the ease with which

these technologies can cross international boundaries, changing the competitive balance in the process.

These technologies already are reshaping livestock production and also may serve as an example of things to come for that sector. In 1987, 73 percent of fat cattle sold annually came out of lots with capacities of more than 1,000 head (Figure 4). That proportion will probably increase. Meanwhile, the proportion sold out of lots of less than 100 head capacity has declined to only about 10 percent. Slaughter plants embodying new processing technology have relocated to areas with concentrations of large capacity feedlots.

Even more rapid and perhaps more dramatic are the changes occurring in the swine industry (Figure 5). Concentration of production into units of more than 1,000 head has increased by factor of about 7 between 1978 and 1987. Almost assuredly higher today, in 1987 58 percent of hogs sold came from these large units. Not surprisingly, the sharpest proportional declines have been in those units selling less than 200 hogs annually.

Figure 5.
**PERCENTAGE OF HOGS SOLD
BY HERD SIZE**

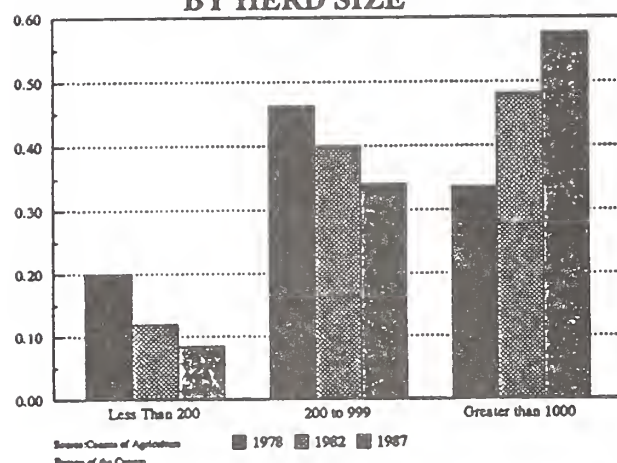
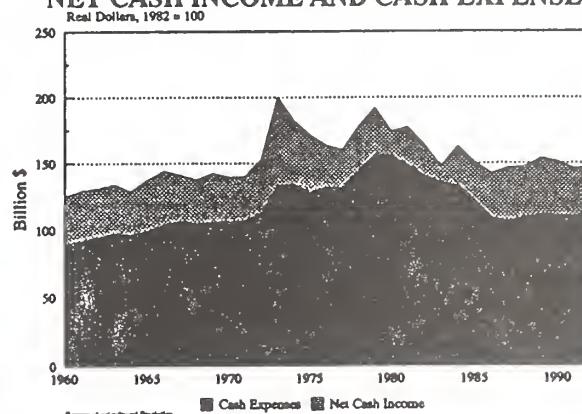


Figure 6.
**UNITED STATES AGRICULTURAL
NET CASH INCOME AND CASH EXPENSES**



The same forces of concentration affect crop production as well. Moreover, the opportunities for vertical coordination appear to be increasing quite rapidly along with the growth in contractual arrangements for crop marketing.

Implications for Farm Borrowers

Broad changes in the underlying economic environment seem likely to spur fundamental changes in the way agricultural borrowers conduct their businesses and relate to lenders. First, farmers will become much more attuned to managing a profit spread (Figure 6). They will become less oriented toward managing the business around intermittent boom years. Just as their urban counterparts, farmers will focus on creating a profit spread and will then work to insulate that from external volatility. Much more attention will be

focused on cost containment and on fixing the cost structure in a predictable fashion. Product pricing strategies will protect the profit spread but will seek to leave open upside price opportunities. Price risk will receive greater attention and will be managed consistent with the farm's financial ability to bear risk. The usually narrow, and perhaps growing more narrow, profit margins in agriculture place a high premium on successful profit management.

Since the opening of the American frontier, farmers have looked to land as a store of value. In the post-World War II period, land ownership became an even more important wealth-creator. Hence, farmers leveraged themselves to purchase land--not just to assure access to its productive capacity, but also to enjoy its wealth effect.

But farmers often overestimate the wealth effect of land ownership. That was particularly true during the 1970-80 period as rising inflation, farm subsidies to underwrite risk, and growing export sales spurred land value increases (Figure 7). Real U.S. farmland values have increased only 47 percent from 1960-91--less than 1.6 percent per year, however. In the future, all three factors may have a much less positive effect on land values. Moreover, currently high real interest rates--which had approached zero as inflation accelerated in the 1970-82 period--decrease incentives to invest in land. Thus, farmers are learning that farmland may no longer build wealth, particularly when a substantial proportion of debt capital is used in the acquisition.

Figure 7.

UNITED STATES FARMLAND VALUE PER ACRE

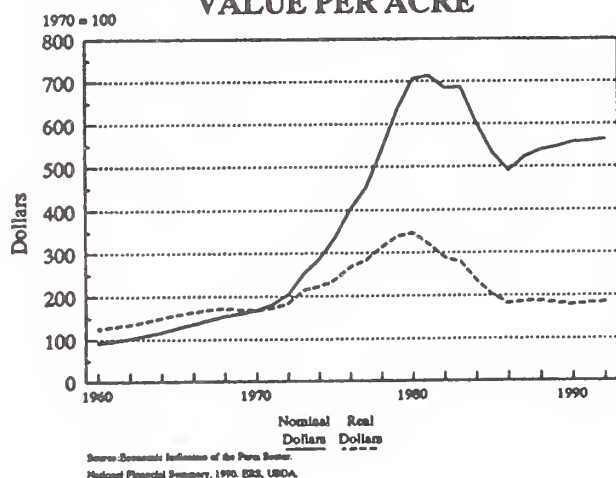
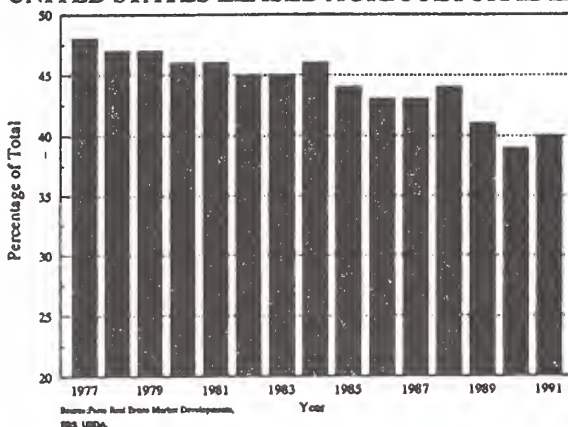


Figure 8.

UNITED STATES LEASED AGRICULTURAL LAND



They now understand that in a noninflationary environment and in a world with relatively abundant food supplies, land is not necessarily a growth asset. Indeed, real values have been trending slightly downward in recent years, following the sharp decline through much of the 1980s.

Instead, good seed, profit-maximizing fertilizer and pesticide programs, and equipment management programs can all produce higher returns on investment than land ownership. While this scenario is not yet evidenced by the proportion of U.S. farmland

leased, many expect it will become so (Figure 8). Lenders also report, anecdotally, that many farmers no longer focus on land ownership as the only means to gain control of the asset.

Much of agricultural lending is supported by security interests in land and equipment. As farmers--and especially newer entrants into farming--devise and rely more on methods to control rather than own production assets, lender's will be forced to rethink their credit products, underwriting standards and sources of security. The answers to these issues will be found more frequently by looking for guidance to practices that have developed outside agriculture than by re-examining past practices in agricultural lending.

Additionally, farmers are managing control of equipment differently. First, they are extending its useful life by improved maintenance. Tractors of 10-20 years of age that still perform well are now common on farms. Second, farmers and agribusiness firms are using lease financing and rental much more frequently, having about doubled the value of such leases outstanding in the 1980s (Figure 9).

Figure 9.
UNITED STATES AGRICULTURAL
EQUIPMENT LEASING

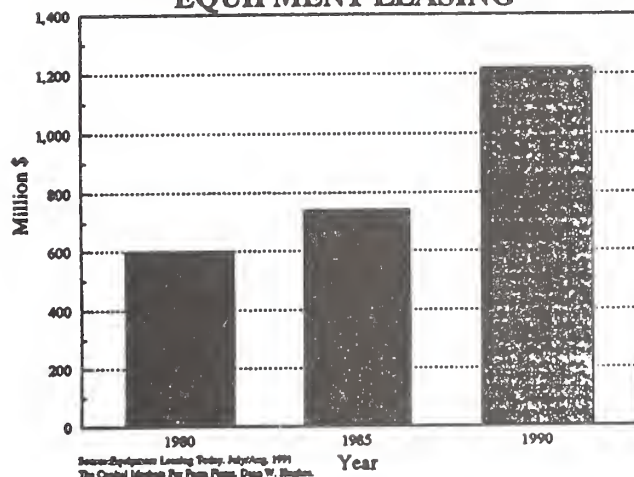
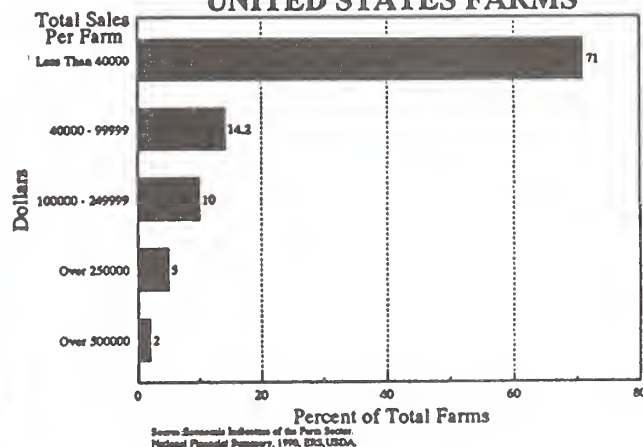


Figure 10.
SIZE DISTRIBUTION OF
UNITED STATES FARMS



Scale and specialization in U.S. agriculture have changed markedly. In the process, there is a bifurcation of farm size (Figure 10). About 71 percent of all farms produce less than \$40,000 in annual sales and often lose money on the business. Most family income comes from off the farm. The farm often represents a lifestyle choice.

Only about 5 percent of U.S. farms sell over \$250,000 annually. Yet, these farms produce the bulk of the nation's food and fiber. Moreover, they capture most of the sector's profits (Figure 11). In 1989 these farms average about \$117,000 in profits per farm, compared to about \$5,700 in profits per farm for farms with less than \$100,000 in sales. Clearly, that figure is skewed downward by the inclusion of a large number of small farms. However, the point of emphasis seems clear: the largest farms are earning much larger profits and are capturing most of the sector's net cash income.

Figure 11.
**UNITED STATES AGRICULTURE
PROFIT/FARM
BY SALES CATEGORY**

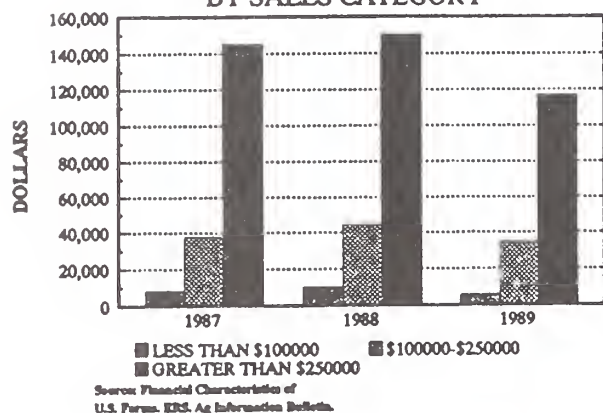
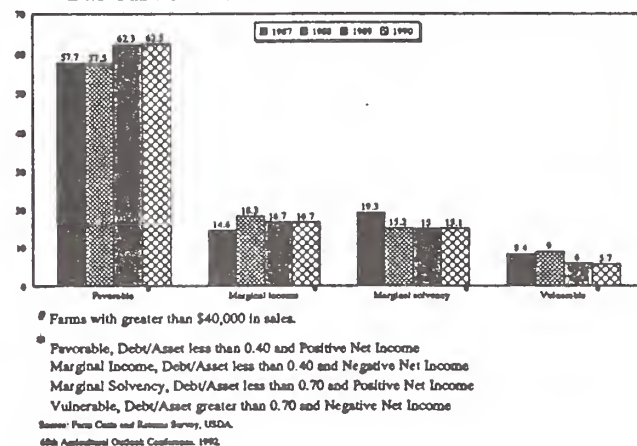


Figure 12.
**DISTRIBUTION OF COMMERCIAL FARMS# BY
FINANCIAL PERFORMANCE RATING**



Generational transfers in agriculture now appear much more likely to utilize family assistance or outside equity funds in entrance strategies. The scale of farming required to meet family living and debt retirement typically far exceeds the resources of a new entrant. Moreover, off-farm income by one or both spouses will become increasingly common. Data on debt-bearing capacity in farming tends to affirm that only especially profitable businesses or otherwise unique businesses can comfortably carry more than about 40 percent debt (Figure 12). Higher leverage poses high and often prolonged exposure to business failure.

Finally, borrower/lender relationships are becoming more at arm's length. Lenders are requiring much more balance sheet, profitability, and performance data from farm customers (Figure 13). Banks underwriting standards have become more demanding. Borrowers who are on top of business financial information find they are able to build stronger and more productive relationships with their lenders.

Implications for Lenders

The scenario examined holds a number of important implications for lenders. First, in real terms the agricultural sector's non-real estate indebtedness peaked in 1979 and has fallen sharply since then (Figure 14). Real estate indebtedness peaked in 1981 and has fallen since then. Farmers have reduced their leverage to more manageable levels. They are not likely to aggressively use debt soon, unless there is a fundamental change in the economic environment. Thus, lenders wishing to add farm loans to their portfolio must bid aggressively against other lenders offering specialized credit products and competitive interest rates.

There is substantial excess capacity among agricultural lenders. Agricultural banks across the nation have a loan-to-deposit ratio of only 54 percent (Figure 15). Bankers say this is

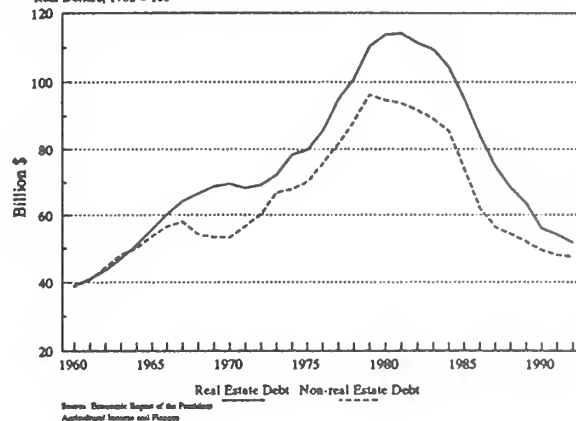
largely resulting from a dearth of demand by creditworthy borrowers. This ratio is far lower than the 80 percent posted for all commercial banks. Farm Credit Associations also find it challenging as they try to add good loans to their portfolios.

Figure 13.
BALANCE SHEET FOR THE FARM SECTOR, 1992
MEASURES OF FINANCIAL PERFORMANCE

	1980-84	1985-86	1987-90	1991	1992
Profitability					
Return on equity	-.01	1.4	3.6	3.4	3-4
Liquidity					
Debt service	19	16	12	11	10-13
Solvency					
Debt/asset	19.7	22.3	17.4	16.3	16-17
Financial efficiency					
Interest/gross cash farm income	12.9	10.8	8.1	7.4	7-8

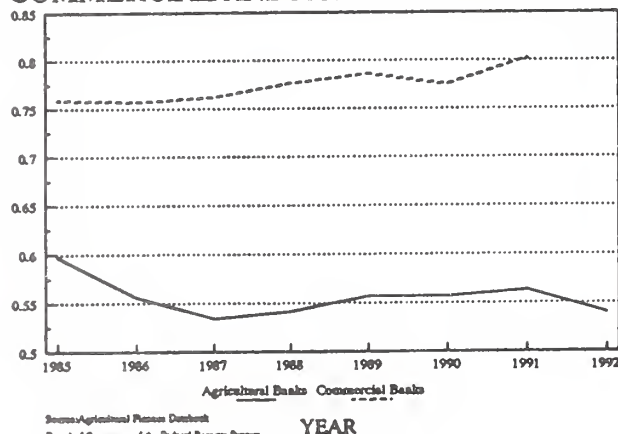
Source: Agriculture Outlook '93: New Opportunities for Agriculture, 8th Annual Outlook Conference, USDA.

Figure 14.
UNITED STATES AGRICULTURAL DEBT
Real Dollars, 1982 = 100



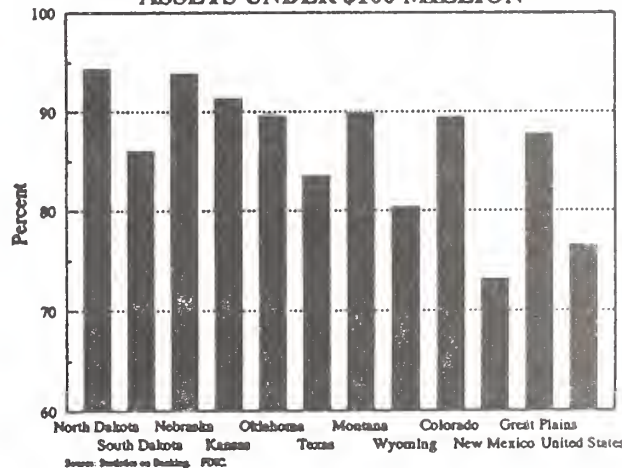
Source: Economic Report of the President, Agricultural Income and Prices.

Figure 15.
LOAN TO DEPOSIT RATIO
COMMERCIAL AND AGRICULTURAL BANKS



Source: Agricultural Pension Database, Board of Governors of the Federal Reserve System.

Figure 16.
PERCENT OF GREAT PLAINS BANKS WITH
ASSETS UNDER \$100 MILLION



Source: Statistics on Banking, FDIC.

Agricultural banks may experience more difficulty in servicing the credit needs of their customers. Most agricultural banks are relatively small. For example, in the Great Plains States almost 88 percent of commercial banks have assets of less than \$100 million (Figure 16). That ranges to a high of 90 percent or more in North Dakota, Nebraska, and Kansas. For the United States, only 76.5 percent of the banks have assets under \$100 million. Among those banks with assets below \$100 million, the average size in the Great Plains is only \$32.4 million (Figure 17). In North Dakota, Nebraska, Kansas, Montana, and Colorado, it is less than \$30 million. Thus, many of these banks may prove too small

to service the full credit needs of their larger customers. Conversely, these smaller banks provide personalized service in checking consumer loans, insurance, etc., to their rural customers. Farm Credit System institutions are perhaps more easily able to meet the needs of larger customers, but they are limited by law as to the customers they serve and the services they offer. Nonetheless, across the lending business today, there is a strong effort by lenders to differentiate services and niche into specialized markets.

Figure 17.
**AVERAGE SIZE OF GREAT PLAINS
STATES BANKS WITH ASSETS UNDER \$100 MILLION**

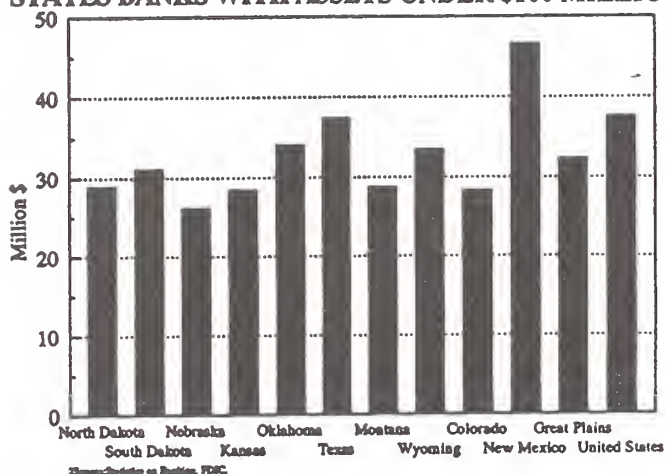


Figure 18.
RISK BASED CAPITAL
Selected Items Included in Risk Based Capital

- 0 percent risk
 - Securities issued by U.S. Government and its agencies
 - Cash, claims on Federal Reserve Banks
- 20 percent risk
 - Claims guaranteed by U.S. Government and its agencies
 - Claims on U.S. depository institutions
 - Claims collateralized by securities issued by U.S. Government and its agencies
 - General obligation claims guaranteed by states and political agencies
 - Securities issued by or guaranteed by U.S. Government-sponsored agencies
 - Privately-issued mortgage-backed securities where the underlying assets are GNMA, FNMA or FHLMC securities or FHA or VA loans
- 50 percent risk
 - Revenue bonds of states and political subdivisions
 - Qualifying loans secured by first liens on 1-4 family residential property
 - Privately-issued qualifying mortgage-backed securities
- 100 percent risk
 - Agricultural loans
 - Business loans
 - Consumer loans

Source: Risk-Based Capital and the Pricing Process, James L. Buever, Journal of Agricultural Lending, Vol. 3 Issue 4.

Introduction of risk-based capital into commercial banking and the Farm Credit System institutions means fewer differences in the regulatory climate in agricultural compared to nonagricultural lending. Greater uniformity in examination procedures and objectives across lending systems also implies greater uniformity of regulatory treatment. The presence of Federal Agricultural Mortgage Corporation (Farmer Mac) will eventually bring greater uniformity in underwriting standards, in order for lenders to do business in the secondary market for agricultural real estate mortgages. Finally, the Financial Standards Task Force Report, which emphasizes standardized analytical ratios and definitions, will bring much greater uniformity to the business procedures of all agricultural lenders.

Unfortunately, the risk weighting assigned to different assets for purposes of determining capitalization seems to discourage lending and encourage holding of assets such as agency securities or mortgaged-backed securities (Figure 18). A smaller level of capital is required to support most other assets than is true for loans. Policymakers and lenders may choose to revisit risk weighting rules as a result.

Across all lenders, however, the regulatory playing field will remain uneven. Indeed banks, Farm Credit institutions, and insurance companies may find themselves at a growing disadvantage to a variety of financial service firms or the finance arms of agribusiness firms. These firms typically function under a very different and more flexible regulatory regime. As a result, they have been taking business from depository institutions, including commercial banks and insurance companies (Figure 19).

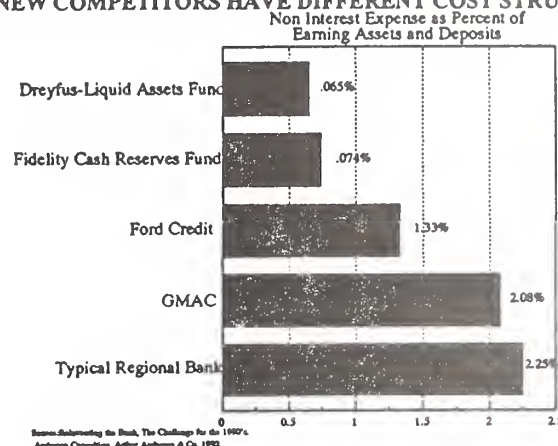
The cost structures of these financial service firms are often lower than traditional lenders (Figure 20). For example, Ford Credit has a markedly lower noninterest expense structure than is true for the typical regional bank.

Figure 19.
COMPETITOR MAKE-UP IS CHANGING RAPIDLY
Portion of Total Assets Held by Financial Institutions

	1960	1989	Share Point Change	% Change
Commercial Banks	34.2%	26.6%	-7.6	-22%
Insurance Companies	21.8%	14.5%	-7.3	-33%
Other Depository Institutions	17.0%	14.1%	-2.9	-17%
Agencies, Mortgage Pools	1.7%	10.8%	+9.1	+535%
Pension Funds	8.8%	15.6%	+6.8	+77%
Money Market Funds	2.6%	8.1%	+5.5	+212%

Source: Subcommittees on Bank, The Challenge for the 1990's.
Anderson Consulting, Arthur Andersen & Co. 1992.

Figure 20.
NEW COMPETITORS HAVE DIFFERENT COST STRUCTURES
Non Interest Expense as Percent of Earning Assets and Deposits



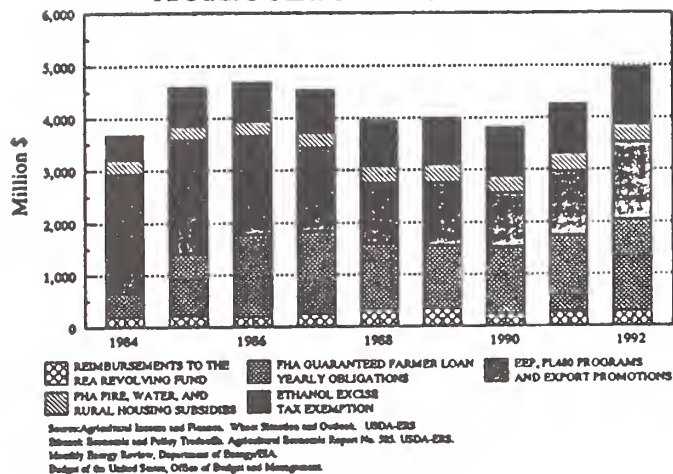
Source: Subcommittees on Bank, The Challenge for the 1990's.
Anderson Consulting, Arthur Andersen & Co. 1992.

Additionally, many agribusiness firms--Pioneer or Deere, for example--are able to use credit services to smooth production schedules, to link customers more closely to the firm to cross-sell products, etc. Thus, these firms may not require the same rate of profitability from direct lending operations that would be necessary for a bank. This vigorous, nontraditional competition can be expected to cause marked changes in both numbers of and business procedures of traditional lenders.

A final issue relates to the role of government intervention in agriculture. That role has become extraordinarily important over the six decades of government farm programs. By way of example, North Dakota farmers in some years capture 100 percent of their farming profits from deficiency payments on farm program crops. Over time, much of the program benefits have been capitalized into farm real estate or other fixed asset values. Thus, the programs are of greater benefit to the earlier than to more recent entrants into farming.

Some observers suggest that growing pressures to reduce the federal budget deficit and the diminishing political influence of farmers will result in marked reductions in farm subsidies. Conversely, the government provides substantial off-budget funding through loan guarantee programs for farmers, in support of agricultural export sales. Earlier this fall, a decision was made to substantially increase ethanol use in gasoline to reduce air pollution levels in a number of large cities. Ethanol receives a gasoline tax exemption at the federal level and in several states. The level of that funding could grow, especially if costs could be borne by consumers rather than taxpayers. Thus, though direct payments to farmers may decline, the impact of these reductions could be softened by growth in various programs using off-budget financing, loan guarantees, and tax exemptions (Figure 21).

Figure 21.
GOVERNMENT INDIRECT
AGRICULTURAL SUPPORT



Conclusions

On balance, substantial changes for agricultural lending appear in prospect. Among the changes one could expect:

- fewer, probably many fewer, banks and FCS institutions serving agricultural producers and rural America;
- much more product and customer differentiation. The market niches will be greater in number and more narrowly defined;
- profitable banks across a wide size spectrum, based on adding unique value to the customer;
- more strategic alliances among lenders to better serve customers;
- a wider array of credit sources available to borrowers;
- a growing number of integrators that link inputs, credit, production, and marketing together through coordination, contracts, and linked ownership;
- intense competition among lenders in a slow growth credit market;
- a loss of agricultural lending as a unique discipline;
- a growing indirect subsidy role for government in agriculture.

Outlook '93

For Release: Wednesday, December 2, 1992

IMPLEMENTATION OF INTEGRATED FARM MANAGEMENT SYSTEMS

Dr. Duane Acker
Assistant Secretary for Science and Education

The whole concept of Integrated Farm Management Systems stresses the big picture, the holistic approach -- in research and in operations. Successfully integrated practices can mean making a profit and protecting the environment -- and agricultural technology is a central component in attaining both of these goals.

Research and extension are in step with this concept. Our research and our models encompass the best of all our technologies: computers and software; biocontrol and Integrated Pest Management; plant/soil relationships; nutrient/erosion correlations; and of course biotechnology.

In my time today, I'd like to toss out some ideas and talk about some new technology that is coming around. You might remember though that the steam that blows the whistle never turns a wheel. The job of the scientist is to make an honest person out of their leader.

Making a profit and maintaining and enhancing the environment are not necessarily in conflict. In fact, they can -- and should -work hand in hand to help an operator market the highest possible value of quality product with the lowest net input cost while maintaining and enhancing the natural resource base.

In today's discussion, a major point we need to recognize is that researchers, consultants, computers, universities, agribusiness, extension agents, and policymakers do not implement integrated farm management systems -- the managers of farm operations do.

Our basic premise must be that the implementation has to be by the operator. That having been said, I will add that over the last four decades, science and technology have recommended to operators a variety of preferred procedures on

how to implement technology and find ways to balance cost with output. Each procedure found a way to expand on the prior one.

I. Let's review briefly what that kind of advice has looked like in the past -- and then see what it might look like in the future.

In the 1950's, the operative concept was least cost/linear programming. The late Earl Heady, economist at Iowa State University, was a pioneer in the use of this mathematical technique. Linear programming is the application of mathematical and economic sciences to biological farm practices to arrive at the most efficient or profitable management of an enterprise.

A feature of the 1950's-60's was the combination of recordkeeping and indexing. Indexing was at its zenith. For example, breeders everywhere would assign a certain weight or economic value to each desirable attribute in selecting breeding stock -- rate of gain, mothering ability, prolificness.... Then, since breeders couldn't just buy attributes -- they had to buy a whole animal, they had a basis for a decision on which purchase would have the greatest overall economic benefit.

In the 1970's, we began to develop computer software to go beyond these two techniques. The computer gave us greater capability to balance more variables. Therefore, we could develop simulations to enable us to look at an enterprise. We had specialized software which let us incorporate more variables in our look at a specific commodity system: rice or cotton -- corn or hogs -- peanuts or feedlots.

In the 1980's, we began to concentrate on combining all of above concepts and methods. We not only have faster and larger capability computers, but we have much more experience in terms of how computers work and what they can do for us. With a broader holistic outlook -- and the aid of our computer tools --, we can look at what to do in a total farm system.

This ability that has come to agriculture is timely. Increasingly, operators are having to factor more and more external pressures into their decisions.

For example, look at how environmental and societal issues have risen higher and higher in our priorities. Agriculture's impact on our natural resources is constantly under review. Some of the environmental concerns can be reduced partially to dollars and cents, while others turn primarily on esthetics. Like animal welfare issues, environmental issues are often hard to quantify.

And, as we are all aware, the current Farm Bill requires the drafting and implementation of a conservation plan for the farm, so this becomes a given that

must be factored in. There may be options within its framework, but a plan must be implemented.

For example, if you've got 114 acres, you might consider 2.3 acres for a terrace, 5.9 acres for headlands, 4 acres for grassed waterway -- and expect 180 bushel corn yield and 47 bushel soybean yield.

II. This brings me back to the realization that, though we might use the computer more, there might be simulations we could yet create, and there might be additional ways to apply it to our total enterprises, ultimately we come back to mind of operator for the final decision.

A computer can narrow our options and it can help us focus, but the responsibility for judgement remains with the operator. He or she must look at computer capability as well as a wide variety of considerations. Overall, you want to lower cost, minimize risk, be environmentally friendly, and control pests and insects and weeds by rotation or other means.

III. The logical question arises, how can an operator make sense out of all this? I'd like to toss out some ideas as propositions.

Let me give you a personal example. I've got some land back in Iowa. After the 20th of January, I'm going to be sitting down and writing down some goals for my use of that land. In fact, I've already started.

So, the first thing I would suggest that an operator do is to write down a mission statement for the operation. A written declaration that answers the question, "What am I in business to do?" Perhaps something along this line: to market the highest possible value of quality product with the lowest net input cost while maintaining and enhancing the natural resource base.

And underneath that statement, there should be a list of goals -specific goals. For an individual operator, maybe a realistic goal could be:

1. An annual return of 8 (or perhaps 10) percent on equity

Removing family living cost

Equipment cost/crop acre (6%)

95% calf crop

180% lamb crop

Corn yield >120 bu

Bean yield >40 bu

2. Less than one ton of soil lost from each acre.

That's not just soil leaving the end of the field, but from each acre up on the side hill. Current standards are 5 tons, but when I was out in Lincoln, Nebraska a few weeks ago, they were telling me about a study done at the Treynor Watershed in southwestern Iowa from 1964 to 1978 on continuous corn on a contour with about a 10 percent slope. On a 15-year average, with moldboard plowing, the soil loss was 38.1 tons per acre per year! With conservation tillage, the loss was 0.7 tons! That's just to illustrate that a goal like that is not out of the ballpark.

3. Less than one inch of precipitation lost from each acre.

I come from western Iowa where we get 27 inches of rain annually --and a loss of less than 1 inch is pretty darn good. So I was really impressed with data from the ARS North Appalachian Experiment Watershed in Coshocton, Ohio (the longest continuous no-till watershed). Their numbers show that over 29 years with continuous corn, no till, on a side hill with 15 percent slope, and a usual rainfall of 39 inches a year, the average runoff per acre was under 0.1 inches!! So a goal of a loss of less than one inch is not unreasonable.

4. Reduction of water use in irrigation by 20-50 percent -- or use of < "x" inches of water.

At the ARS Water Management Research Laboratory in Fresno, California, a scientist told me that the east side of the Central Valley could lower its water requirements by installing a subsurface drip irrigation system. At a conservative estimate, such a system could lower water use by 20 percent -- and in some cases by as much as 50 percent. Contrary to what you might think, yields would increase -- thanks to the more uniform water distribution.

Near Fresno, one large-scale vineyard put in an underground irrigation system with spectacular results. The annual gross return doubled from \$2,000 to \$4,000 an acre so the system paid for itself in a year. And water use went from 5-6 acre feet to 3 or less. So a goal of 20-50 percent could be realistic.

5. Reduction of fertilizer use vs. application of <110% of nutrients required to produce the projected yield.

Standard fertilizer recommendations don't consider several site-specific variables that can influence nitrogen availability and nitrogen fertilizer requirements. That's why preplant nitrate nitrogen tests can be an effective management tool. In Wisconsin, researchers found that in 1989, 42 percent of the fields pretested had more than 200 pounds of nitrate nitrogen in the top three feet. In 1990, 35

percent of the fields tested did. Therefore, in those years, farmers knew that no additional nitrogen was needed on those fields.

5. Or you might set up a whole group of goals that are interrelated.

One of our most exciting new projects is the Walnut Creek Watershed near Ames, Iowa. Under the direction of USDA, the Environmental Protection Agency, and the U.S. Geological Survey, this is the first on-farm model project for the Integrated Farm Management Systems program.

It is a large-scale demonstration of all of the aspects of IPM in an actual, working situation. Walnut Creek will combine IPM methods with the best practices for soil conservation and improved water quality management -- with an eye on maintaining an economically viable farming enterprise overall.

One of the real challenges in the IFMS program is placing economic value on the environmental benefits provided by this approach. Operators today make management choices based on the bottom line. We must develop better understanding of the economic as well as the environmental aspects of a variety of management and technology options in the context of the complete farming system.

For example, an ARS scientist in Mandan, North Dakota, has designed an innovative crop rotation system that balances economics with environmental concerns. In the Northern Great Plains, this rotation uses successively deeper rooted crops -- such as sunflower or safflower -- to capture excess moisture and nutrients in the soil. This stored water and nitrogen can then be used by the spring wheat/winter wheat that follows in a rotation. By growing a crop every year -- instead of traditionally idling the land every second or third year -- operators protect the soil from blowing away, stop water runoff and leaching, and make more money.

IV. In conclusion, I would suggest that perhaps agriculture could get together on some of these areas. Maybe crop farmers need to work with each other to develop a code of cropland management. Maybe intensive swine and poultry operators, as an industry, as an association, need to develop a code of animal management.

Let me review the four basic points I want to leave with you today. I began with the basic premise that it is the operator who will ultimately make the decision and implement the integrated farm management system. Second, I recommend writing down a mission statement for yourself, and then third, set up a series of specific goals that will help you fulfill that mission.

But emphasis on the implementor that does not mean that there is no role for agribusiness, agriculture consultants, Extension, or universities. I want to stress that each of these groups can work to lead their clients to this point. If you do, then you may arrive at my fourths point. It may be that the farmers themselves will say decide to link arms and establish a code for the community, or for an enterprise. This could be a code of animal management, a code of cropland management, or a code of range management.

Science and technology have always had a crucial role in helping operators implement technology, protect the environment, and find ways to balance cost with output. That role will continue -- no matter who is in the White House. But the important thing to remember is that it is the operator who must see the necessity and the possibility for change -- and who will make the judgement calls that make integrated farm management systems a success.

AGRICULTURAL TECHNOLOGIES FOR THE NINETIES

Vivan M. Jennings

Deputy Administrator, Agriculture, Extension Service (USDA)

By the turn of the century, today's new technologies, resultant from many years investment in basic and applied research, may be integrated into the new high-tech agricultural systems of tomorrow. These new technologies will be integrated into agricultural systems if we have adequate knowledge regarding how they will work as part of a sustainable system. This knowledge must be readily available to farmers and public and private sector advisors working with them, and better understood by the consuming public. The agriculture systems of tomorrow must continue to meet the needs of people and be competitive in a global marketplace. The efficient and successful development of future agricultural production systems will require embracing, across-the-board, public-private sector collaboration.

The U.S. farmers knowledge and understanding of the application of new technologies incorporated into integrated management systems, is viewed with envy by our global competitors and will increasingly be a key component in the complexities of future U.S. competitiveness. In order to maintain this position, decision support systems need to be developed which integrate economic, environmental and social acceptance into the decision making process. Simple technology transfer models will not serve the agriculture of the future.

New electronic information and communication technologies, and selected biotechnologies, are replacing capital and labor intensive technologies of the past. There is added dimension, however, that farm level decisions must include an awareness of environmental and social impacts of those decisions.

Visionary Hindsight and Mutual Gain

Individuals involved in research, development and technology transfer need "Visionary Hindsight" to look back from their vision and articulate their specific role in the food and agriculture system of tomorrow. We believe, as farmers and ranchers do, that we must be good stewards of the land, other natural resources and our human capital. Many recognize we are now experiencing some degree of "hindsight." We recognize that we may have weighed factors such as productivity and profitability a bit too high and a new balance must be struck. That balance, between profitability, global competitiveness, productivity, environmental and social impacts, will provide mutual gain for agriculture and the global society of the future.

We recognize it is very important that technologies be brought on line which lower capital requirements and reduce the unit cost of production. Debates continue regarding the issue of size neutral technology development and how best to design size neutral technology transfer systems.

In addition, it is becoming more clear that all farmers and ranchers must be able to apply environmentally benign and socially acceptable least cost technologies as part of knowledge based systems. Achieving these goals is critical if U.S. agriculture is to maintain a competitive edge in global markets.

TECHNOLOGICAL ACCEPTANCE BY SOCIETY

Society is in the process of sending a message to agriculture and agriculture needs to listen. The message is about:

- ◆ The characteristics of change and expectations from agriculture;
- ◆ The acceptance of technologies and the application in food production, processing and marketing systems; and
- ◆ Society not only wants agriculture to be profitable for farmers but it wants agriculture to be competitive in global markets and to produce safe and wholesome products in an environmentally acceptable way.

Agriculture can not afford to be inconsistent with a societal message that it benefits and serves not only farmers and ranchers but all Americans and many citizens in countries around the world.

Global Acceptance

By the year 2000, it will not be enough to only make new technologies available for profitable application on U.S. farms. New global agreements will require global acceptance of new technology applications. The U.S. comparative advantage will come from swift incorporation of new technologies into agricultural and food production, processing and marketing systems. Societal expectations will increasingly demand greater documentation and accountability of benefits of the new technology. This accountability will require interdisciplinary approaches toward a plan driven, systems based approach which is ecologically sound, socially acceptable and consumer driven.

Human Safety Acceptance

Application of any technology likely to pose a threat to the human health and well-being will be unacceptable. Continued research will clearly delineate the level of allowable natural or synthetic compound residues, if any, in edible portions of foods. No amount of violative residues remaining in edible tissues will be tolerated. The impact of technologies on the nutritional value of foods will face increasing scrutiny. Food labels will likely contribute to an increase in consumer interest in nutritional attributes of food products. There is no debating that human health will be an area where compromise will not be acceptable.

Environmental Acceptance

The benefit of the new technology to the consumer, as well as the farmer, must outweigh the environmental risk associated with its use. In the absence of education, the public's perception of risk will be their reality. Consequently, the potential for public outrage from a perceived excessive human health or environmental risk may be too great to overcome the potential benefit of the technology.

Social and Consumer Acceptance

Consumer and broader social acceptance of new technology applications depend on a broad array of determinants. Many determinants are often presented in a way which potentiates the public developing a negative response. Improved communication between researchers, farmers and consumers has resulted in improved understanding of benefits from new technologies and greater public acceptance of the need for their use. Scientists are viewed by the public as basically credible sources of information. Thus, scientists need to devote more time to public communication. This task must not be arbitrarily passed off to intermediates such as information specialists and the media to take care of.

Target Plant and Animal Issues

The safety and well-being of technology applied to target animals or plants in an inappropriate way often leads to criticisms and acceptability of targeted applications. This leads to development of issues such as animal safety and welfare, the impact of the technology on metabolism, nutrition and disease resistance. Agricultural systems, incorporating new technologies, need to be carefully designed, developed and implemented which focus on safety and well-being of animals.

A SYSTEMS APPROACH VISION TOWARD 2000

By the year 2000, a socially acceptable farm or ranch plan will need to be more commonplace than is currently the case for many farmers and ranchers. It needs to be developed consistent with a consumer demand driven approach. The resource base will be wisely used as part of an integrated management system applying new technologies to produce safe, healthy food and fibre products, which when processed, meet consumer demand. It must be emphasized, the development of these collaborative plans will require research and education efforts across the broad continuum of individuals working with the agricultural sector.

Resources Application

An acceptable plan will be based on wise use of resources. This includes not only natural resources, but financial and human capital resources as well. And, of course,

our technological resource database, often accessible electronically through advances in information technologies will provide static and dynamic data to drive decision aides needed by the system.

There is no question our current food and agriculture system is dependent upon a wide array of resources. A number of the resources we currently depend upon are viewed by many as non-renewable. The non-renewable nature of many of our current energy resources is an issue. There is increasing interest in agriculture actually contributing energy, for its use and ours, by way of products such as methanol, ethanol or longer carbon chain products for use in diesel, four cycle, or perhaps new generations of two cycle engines. However, this will only be a reality if these production systems also pass our tests of competitiveness, profitability, impacts on the environment, etc.

Implementing a management systems oriented approach to the development of the agricultural systems of tomorrow is very important. Some might view this effort as the Total Quality Management (TQM) equivalent for agricultural systems. These approaches will need to focus on improving the efficiency and appropriate use of all the resources harnessed by the food and agriculture system.

Production System

The food and agriculture production systems of the future will be sustainable in the broadest context. This will entail a focus on TQM or integrated management systems approaches. A key attribute of these approaches will be the recognition that the strategies applied will result in site specific plans and actions. They will also result in meeting the needs of global consumers.

To be more specific, a production and marketing system is composed of sub-system components utilizing technology (the application of knowledge), information and management to determine how best to use the resources available, all interacting as a team to achieve a desired outcome. These strategies also include recognition of the need for strong rural communities and involvement of their citizens as integral components which support and contribute to the success of production systems.

A good example of the interdependence of agriculture on rural, and in some cases, urban communities and their vitality is brought out in the 1990 Economic Research Service (ERS) survey of farm costs and returns. Overall, 55 percent of all farm operators in the survey had negative farm incomes. They reported offsetting their farming losses with off-farm income. Off farm income, as a percent of household incomes, was 57, 33, and 22 percent for the three largest farm size categories in the survey. Thus, U.S. Agriculture is, by-and-large, dependent upon off-farm, rural community accessible employment.

Marketing, Processing and Consumption

The explosion of new electronic information and communication technologies has allowed marketers a means of selectively and effectively targeting consumers in the global marketplace. The ability of marketers to effectively reach consumers is central to understanding the driving force impacting agricultural production, processing and marketing systems and the use of resources, including new agricultural technologies. Marketers have effectively used technology to develop vast networks allowing for the exploitation of both domestic and international markets for their products.

The resultant elaborate marketing systems allows niche market targeting and new demand for specific products from the agricultural system.

This will dramatically change the agricultural production systems to match consumer demand if, and when, there is indeed an opportunity to profit from the changes.

Trade policies often determine if being globally competitive equivalent to profitable production, processing and marketing of products.

The ubiquitous demand for quality, value and safe food products establishes the framework for agricultural production and the use of new technologies. The new technologies must not only need to maintain productivity but lower unit cost of production while reducing human health and environmental risk. New technologies which meet these objectives of mutual gain will be more readily embraced by farmers, ranchers and consumers.

The food and agriculture system will continue to face challenges and adjustments as it strives to meet the expectations of society. The role of education is key to system-wide implementation and development of new technologies which fit into future sustainable agriculture systems. Sustainable systems will require a larger "toolbox" of options available to agriculture. More knowledgeable and more highly skilled individuals will be required to ensure future agricultural systems are functional.

Outlook '93

For Release: Wednesday, December 2, 1992

ADAPTING FARM PRACTICES TO NEW TECHNOLOGIES

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Farm Practices and New Technologies:

The farm practices that a farmer follows are typically those that he is familiar and comfortable with because of past successes. If it worked once or more then it ought to work again. Farmers who adopt new technologies and new methods will likely find it necessary to alter some of their standard practices. Changing farm practices may take several attempts of assessing the strengths of a new technology and incorporating its use into a farming system. This process will likely require some changes and adaptation for both the new technology and the farming practices that it influences.

Information Technologies:

Most of my comments today regarding new technologies will come from the perspective of computerized information technologies that farmers are using to improve their management skills and decisions. These information technologies may be expert systems to assist in a single decision or serve as a decision-base for an entire management system. The decisions affected might include production inputs, marketing strategies, or troubleshooting an equipment failure. For individual farmers to improve their competitive position both locally and globally they need timely, accurate information regarding all aspects of his farming operation.

One information system that has been used by cotton farmers in nearly all the cotton producing states since 1985 is a computer simulation model and expert system called GOSSYM-COMAX. This program simulates cotton growth, yield, and demand for nutrients. Management decisions are made from the information base developed by simulating current crop status and predicting future crop growth with varied weather scenarios. Typically, application of irrigation, fertilizer, growth regulators and crop termination chemicals can be managed with this system. The ability to compare possible outcomes of a decision or series of decisions greatly improves the management capabilities of cotton growers. Managing cotton using this approach is vastly different from a conventional management system. Analysis of grower use and response to this approach can provide valuable insight into the incorporation of other new technologies with current farm practices.

Model Description:

GOSSYM-COMAX utilizes information regarding soil physical and chemical status, daily weather data, and crop management inputs to simulate a cotton crop. The model uses a mechanistic, materials balance approach to simulate supply of and demand for carbohydrate and nitrogen in the plant and nitrogen and water in the soil. Data required by the model includes soil physical descriptors that quantify the ability of a soil to retain water (water retention curve), move water (hydraulic conductivity), and the hardness of the soil (bulk density) for each layer of the soil profile. These characteristics vary with soil classification and soil texture. This information has been gathered into a database of nearly 300 "soil hydrology files" for GOSSYM-COMAX use across the Cotton Belt. These files are developed from an undisturbed soil core and do not have to be resampled with each season, unless the soil environment is altered by land-leveling or other major disturbance. The chemical status of the soil is sampled annually at the beginning of the season to give the model a starting point for the simulation. Soil nitrate, ammonia, percent organic matter, and percent field capacity are measured in 6 inch increments to a 3 foot depth. Weather data are recorded using automated weather stations that are typically located within 5 to 10 miles of the fields to be simulated. These weather stations measure and store daily maximum and minimum temperatures, solar radiation, wind, and rainfall. Weather data can be accessed by modem and the weather files are automatically updated. Field management information including crop emergence date, plant population, fertilization events, irrigation events, and application of growth regulators and harvest aids are entered in the system for each field being simulated.

The requisite information is then used to mechanistically simulate the growth and development of the cotton crop for specific fields or management units. The growth is simulated on a daily time-step using materials balance techniques to account for the supply of nitrogen and carbohydrate to the plant and the demand for those nutrients. The demand is based on the growth rate of the crop. When the demand for a particular nutrient begins to outstrip the supply, then a stress is registered and the growth and developmental rates are slowed and fruit loss will likely occur. The regulation of cotton growth can be accurately simulated if the supply of nutrients and the weather and soil conditions are accurately measured and entered in the system.

Management Decisions:

Farmers use GOSSYM-COMAX to make management decisions both before and during the growing season. Before the season begins it is possible to use several different historic weather files to simulate growth and yield responses to different varieties, plant populations, row spacings, and fertilization levels for each cotton soil farmed. These simulations can identify practices that are best suited to certain soils, while not suited to other soils. This approach can provide some general guidelines that a farmer would plan to use for each field during the season.

When the growing season begins, the historic weather data are superseded by actual weather

data from a weather station. Field inputs are also updated to allow in-season simulation of crop status and in-season management of the crop. Since factors such as the cotton variety planted, cannot be changed once the season begins the farmer focuses his management efforts during the season on those inputs that can be fine-tuned. The general principle used in making in-season management decisions is that some stresses registered by a GOSSYM-COMAX simulation can be relieved by a timely management practice. For example, if GOSSYM-COMAX is predicting the occurrence of water stress 5 days from now, an irrigated cotton farmer could avoid the deleterious effects of the stress by irrigating that field before the onset of the stress. Similar logic can be applied to fertilization. If a nitrogen stress is predicted during the boll-fill period, then additional fertilizer may be appropriate. Two major advantages of using simulation models for crop management decisions are that the future status of the crop (e.g. stresses) can be known up to 14 days beforehand, and the possible outcome (e.g. growth and yield) of a management decision can be assessed with the model.

A grower can play a series of "what if" scenarios to decide best management practices every week for each field. He may discover that additional fertilizer will increase cotton lint yield, but will also cause an unwanted delay in maturity. If his current predicted yield level is economical for his current inputs, then little advantage would be realized when weighed against the extra risk associated with delaying harvest of the crop. If a farmer can test many hypotheses without risking economic or environmental resources, then information-based management decisions can improve his economic return and resource conservation.

An expert system has also been implemented within the GOSSYM-COMAX system to provide some general guidelines for managements decisions. Growers and consultants, however, have expert skills for their locale that exceeds the ability of the general expert system for the entire Cotton Belt. Growers who use their own analytical skills and GOSSYM's predictive ability to test many management hypotheses can identify best management practices for each soil and field they farm.

Farmer Adoption of GOSSYM-COMAX:

To effectively use GOSSYM-COMAX, a farmer must adopt a different view of his decision-making process. Rather than depend on his own "mental model" he must rely, in part, on the information generated by GOSSYM-COMAX. A farmer's transition from his current management strategy to a simulation-based management strategy using GOSSYM-COMAX has been of interest to extension educators and has been studied by Giesemann in 1988 and by Ladewig, et al. in 1989 and again in 1992. My remaining comments will be based on these published reports, unpublished surveys performed during GOSSYM-COMAX training sessions and , personal observations.

GOSSYM-COMAX users are typically large farmers, with over 1800 acres of cotton on average (Ladewig and Thomas,1992), compared to a national average of less than 300 acres of cotton per cotton farm (Matthews, et al., 1991). More than 80% of GOSSYM-COMAX farmers reported greater than \$200,000 worth of gross farm sales. These farmers are also

highly educated, with 68% having completed at least a B.S. degree. These cotton farmers have also farmed for almost 20 years and are 44 years of age, on average. Although these GOSSYM-COMAX farmers (numbering almost 100 in 1991) appear above average of typical farmers, they actually farmed fewer acres than a control group of cotton farmers (attending the Beltwide Cotton Conference) used in the 1992 Ladewig study.

Farmers that use GOSSYM-COMAX are very management intensive. An unpublished survey found that farmers using GOSSYM-COMAX also used agronomic consultants on over 40% of their cotton acres and pest management consultants on over 85% of their acres; compared to 56% of the cotton acreage scouted for pests across the Cotton Belt (Crutchfield, 1990). Growers planned to use the program to manage eight fields containing 880 acres of their 1800 acres of cotton in 1990. They planned to devote almost 8 hours per week to accomplish this task. The value of the management information that GOSSYM-COMAX can provide is evidenced by the time and resources that farmers were willing to dedicate to the program.

GOSSYM-COMAX users can be divided into 3 groups. The exceptional user, users with staff assistance, and users without staff assistance. The most recent Ladewig report shows that farmers that have assistance among their own staff in using GOSSYM-COMAX had a higher degree of success with the program. We have also identified at least one GOSSYM-COMAX user as exceptional, due to the extensive use of the model to make decisions. Kenneth Hood, a cotton farmer from Gunnison, MS reported at a recent meeting of the American Society of Agronomy, that he simulates over 300 crops each winter to make plans for the following season. He also makes nearly that many simulations again during the growing season with the updated data. He reported using GOSSYM-COMAX for all the decisions mentioned earlier, and to make decisions regarding purchasing land, and irrigation systems before the season started. During the season he also used the program to assist in making insect control decisions, based on the size and maturity of bolls that were subject to insect attack. Simulating 300 scenarios before the season starts is exceptional, when compared to the average GOSSYM-COMAX farmer's 94 simulations per season reported by Giesemann (1988) and less than 50 simulations per season reported by Ladewig and Taylor-Powell in 1988. Hood's use of GOSSYM-COMAX for decision support should be viewed as a potential for farmers using the program and not as an anomaly.

GOSSYM-COMAX can provide more decision-support when farmers have assistance in collecting data and/or running the program. According the recent report by Ladewig and Thomas (1992), just over half of the GOSSYM-COMAX users had staff to help them run the program. The farmers who had assistance made almost twice the number of simulations on irrigated fields and were managing 2.5 times more fields than those with no assistance. Greater use of the program by the farmers with assistance resulted in greater economic benefit of the program. Farmers with no assistance in running the program reported that GOSSYM-COMAX increased their net income \$36/acre, while those with staff assistance found their net income increased by \$54/acre. It appears that like most things in life, the more you put into GOSSYM-COMAX the more that you will get out of it.

Each season, growers must decide whether they will continue to use this technology. Ladewig and Thomas reported in 1992 that 75 percent of the farmers who used GOSSYM-COMAX in 1991 would use it again in 1992. A multivariate analysis was used to determine which factors had the most affect on a farmer's decision to use the model the next season. Ladewig and Thomas stated that "increases in net farm income had the greatest affect on one's decision to continue using GOSSYM-COMAX". They also stated that other factors in the analysis were also significant, indicating that the "indirect affects of other variables also play an important role in the decision to continue using GOSSYM-COMAX".

In locales where the model has performed accurately, continued use of the program has been near 100 percent. In a recent evaluation of 60 fields in Missouri simulated by GOSSYM-COMAX from 1987 to 1991, lint yield was found to be simulated with near 80 percent accuracy by the 1991 version of GOSSYM-COMAX (Albers et al., 1992). Subsequent analysis of this database with the 1992 version of the program and a beta version for 1993, have shown 2 percent increases in accuracy with each new version tested. The program was first used in Missouri by 2 users in 1987, and the number of users has grown to 17 farmers and 5 consultants in 1992, with 100 percent retention of users. If the program works accurately, then growers confidence will improve and more management decisions can be made by growers.

Adapting Farm Practices

When a management tool such as GOSSYM-COMAX is implemented, it is quite likely that management practices that farmers do not currently follow will be recommended. If the "new" practices are followed, the farmers will likely watch the resulting crop growth very closely to help decide whether the new practice is any better, and if it resulted in the growth and yield response predicted by GOSSYM-COMAX. Farmers interested in this "new" practice may use a strip test or leave a "check" area in part of a field that will be harvested separately to compare yield. The 1989 Ladewig study reported that GOSSYM-COMAX recommended new practices to 75 percent of the farmers using the program. Most of these dealt with nitrogen fertilization (65% of farmers) but some reported that GOSSYM-COMAX recommended new practices in irrigation scheduling (47%) and crop termination (38%). For each management variable, the GOSSYM-COMAX suggestion proved better in the majority of the cases. Moreover, farmers reported that GOSSYM-COMAX nitrogen recommendations proved better 63 percent of the time.

Since GOSSYM-COMAX users usually simulate less than half of their acreage, but report good results on the simulated acres, the majority of GOSSYM-COMAX farmers transfer management recommendations to other fields. Even though this transfer is not recommended, Ladewig and Taylor-Powell (1989) reported that farmers feel that using principles and patterns observed from GOSSYM-COMAX along with their own experience is better than using their experience alone. Since farmers watching their fields closer when they use GOSSYM-COMAX and have a better understanding of cotton physiology (Ladewig and Taylor-Powell, 1989) farmers have the confidence to transfer management principles from one

field to another, if field conditions are similar.

Even though GOSSYM-COMAX is a materials balance model that can accurately simulate the required amounts of nitrogen fertilizer and irrigation, possibly the greatest benefit of using GOSSYM-COMAX is improved timeliness of those inputs. Farmers using GOSSYM-COMAX can plan some practices 7 to 14 days ahead of time. This simulated foresight allows farmers to evaluate several scenarios to identify the best management practice before the stress occurs rather than hastily responding to a stress or deficiency that is already occurring. This approach permits more judicious use of inputs, potentially reducing both economic losses and environmental hazards.

Future Adaptations:

Another technology that may soon be readily available to farmers will of integrate global positioning systems (GPS) with geographic information systems (GIS) to develop site specific information on soils and crop (yield) status. A management practices then could vary across a field, based on soil factors, rather than applying an average amount of fertilizer or other agchemical. Recent technology advances have produced methods of in-field sensing of soil nutrient, light reflectance to measure soil organic matter, and video techniques to "see" weeds to spray. Custom applicator rigs that vary rates of both herbicides and fertilizers are commercially available. This methodology is referred to as "prescription farming" or "farming by the foot", and could incorporate the use of a simulation model and expert system to evaluate the possible outcomes of using different rates of fertilizer and or pesticides on areas of differing fertility or texture. Once again, a simulation model could evaluate risk of different management options, without risking economic or environmental resources.

Conclusions:

Even though the use of GOSSYM-COMAX has resulted in changes in field farm practices such as irrigation and fertilization, a more fundamental change in the way that cotton farmers make decisions may have the longest lasting impact on the farm operation. The management strategy that many of the GOSSYM-COMAX farmers use is one of data gathering, hypothesis testing, and management decisions based on field-specific information, rather than a generalized recommendation for their region. Future adaptations might even allow decisions to be made on a basis of small soil areas within a field.

The education level of GOSSYM-COMAX users may have affected the open-minded attitude that permitted almost two-thirds of these farmers to follow a new field practice. An emphasis on information regarding their crop-ecosystem was noted in farmers using this information technology. When more resources were spent utilizing this technology, the greater the economic return to the farmer (45% greater return for farmers with staff assistance).

New technologies do not always fit easily into a farmers management system. If a new technology has a sufficient period of testing and evaluation, then it should be able to make a contribution to a farm system. Farmers make changes in their farming practices based on

how that change will impact their economic status. If that change will show improvement in their bottom line, then they will likely adapt their farm practices quickly. If the new technology lowers their labor or capital requirements, then the it will be adopted quickly. New technologies must also be tested and accepted well enough to permit its acceptance by a second tier of farm decision makers, including ag lenders and landlords, who also have major input into practices followed on farms. New technologies that permit farmers to reduce their cost of production on a unit basis (\$/lb) by improving the farmer's understanding of the crop and evaluate possible decisions before making any decision or spending any dollars, will greatly improve the farmer's competitive position and the sustainability of his farm.

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Outlook '93**For Release: Wednesday, December 2, 1992****"RECESSION IMPACTS AND ECONOMIC OUTLOOK FOR THE
U.S. NURSERY, GREENHOUSE, AND TURFGRASS INDUSTRIES"**

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U.S. Green Industry expansion was slowed by the recession but continues up

Although growth in the U.S. Green Industry was slowed considerably by the recession of 1990-92, retail sales and producer receipts continued to advance to higher yearly levels. Grower receipts in the greenhouse/nursery (G/N) ¹ sector continue to outpace all other agricultural sectors demonstrating the underlying strength in consumer demand for this sector's products. Similar to the recession of the early 1980's, the recession of 1990-92 has reiterated that the G/N sector is very "recession-resistant" but not "recession-proof."

Weather and production problems also impacted G/N sales

Retail sales and, correspondingly, grower receipts in 1991 and 1992 have not only been adversely impacted by the lackluster economy, but also the weather has played a major role. Generally, wet weather this year during much of the primary marketing season substantially reduced nursery and garden center sales in many areas of the country. Hailstorms and floods in the South and Midwest, a freeze and a drought in the West, and Hurricane Andrew in the South have contributed to producer, distributor, and retailer losses. Also, significant crop losses from chemical product problems and insect and disease infestation outbreaks have added to the setbacks.

G/N sales will swing up faster than the GDP

The U.S. gross domestic product (GDP) increased a modest 1 percent in 1990 while the U.S. G/N sector registered a 7 percent gain. This was below average for the G/N sector which

¹ The term "G/N" in this report or "greenhouse/nursery" industry, refers to all non-edible horticultural products which encompasses floriculture, environmental horticulture, turfgrass, and related products. It excludes horticultural seeds, cut Christmas trees, and greenhouse food crops.

has posted annual growth rates of 9-10 percent or higher for the past 20 years. In 1991, the GDP (real growth rate measured in constant 1987 dollars) fell by 1.2 percent which caused the slowest growth year in G/N producer sales (only 2 percent over 1990). Retail consumer expenditures for G/N products reached \$38.9 billion in 1991 or about \$154 per capita. The GDP is expected to rise 1.8 percent in 1992 which should result in a 5 percent increase in G/N product sales to \$40.7 billion (\$160 per capita).

As the economy slowly improves, consumer demand for flowers and plants will accelerate. The 1993 G/N industry outlook for consumer expenditures and producer receipts is for a gradual, renewed expansion at a more moderate rate than the rapid expansion of the 1980's. For 1993, the GDP is forecast to grow 3.1 percent which projects to an 8 percent growth in retail G/N product sales to nearly \$44 billion (\$170 per capita).

Consumer expenditures for floricultural products in 1992 are estimated at \$17 billion while expenditures for environmental products are projected to hit \$23.7 billion. Next year, floriculture expenditures are forecast at \$17.9 billion and environmental expenditures are predicted to increase to about \$26 billion. The floriculture expenditure forecasts in 1993, by commodity groups, are:

- O Cut flowers/cut greens, \$6.2 billion, up 4-5%
- O Flowering plants, \$4.4 billion, up 7-8%
- O Foliage plants, \$2.3 billion, down 1-2%
- O Bedding/garden plants, \$5.0 billion, up 8-9%

Insufficient data preclude making expenditure estimates by commodity groups for environmental products. However, in aggregate, retail sales of environmental plants should rebound and the overall increase could be as much as 8-10 percent. The total retail market in 1993 of \$26 billion for environmentals will consist of the following categories with their approximate marketshare percentages:

- O Shade/flowering trees, 17-19%
- O Evergreens, 36-38%
- O Turfgrass, 16-18%
- O Fruit/nut plants, 8-10%
- O Bulbs, 4-6%
- O Other environmentals, 12-14% ²

Per capita consumer expenditures for floricultural plants exceeded \$65 per person in 1991 and are projected to increase to nearly \$67 this year and \$70 in 1993. Consumer expenditures for environmental plants were \$89 per capita in 1991, nearly the same as the previous year, but are projected to rise to \$93 this year and to more than \$100 per capita in 1993.

² Includes unfinished plant materials, rose bushes, groundcovers, vines, etc.

Growth in consumer demand has been dramatic for green industry products. Retail sales of cut flowers, green, and blooming plants alone soared 77 percent from 1982-87, then another 23 percent from 1987-92. This is an increase of 118 percent in 10 years! The environment is becoming increasingly important to people, especially nature conservation and the protection and development of green areas. This demand for improved exterior environments has also increased our awareness of interior environments. This is the economic driver that is leading to higher and higher grower cash receipts for floricultural and environmental plants.

G/N grower receipts are becoming increasingly important to U.S. agriculture

Grower cash receipts for nursery, greenhouse, and turfgrass agriculture totaled \$8.4 billion in 1991 (39% floriculture receipts, 61% nursery, turf, etc.). Even though this was a modest increase of only \$200 million over 1990 grower receipts, the G/N sector now ranks number 6 of all commodity groups, surpassing broiler receipts for the first time. It is nearly 11 percent of all farm crop cash receipts. Farm cash receipts for greenhouse/nursery crops in 1991 exceeded receipts for all food grain crops by \$1.6 billion. G/N receipts were also 67 percent higher than the combined values of all sugar and tobacco crops.

The 1992 G/N sector grower receipts should advance another \$400 million to reach \$8.8 billion while 1993 receipts should experience an even sharper rise to a record level of \$9.5 billion. Commercial production of greenhouse/nursery crops occurs in all 50 States and it ranks in the top 5 commodity groups in 21 States. It ranks as the second most important commodity group in California and Florida.

In 1990, net income per farm for all greenhouse and nursery farms averaged \$53,589. The average income for G/N sector farms increased at 10 percent per year during the 1987-90 period. The G/N sector farm income is 4 times larger than the all farm income which averaged \$13,458 in 1990.

Changes in grower receipts varied significantly by region last year

The Southern region³ was number one in grower receipts for greenhouse and nursery crops at \$3.25 billion in 1991, up 2 percent from 1990. Receipts were 2-2.5 percent higher for both greenhouse crops as well as nursery crops. This one region accounts for more farm cash receipts than the U.S. tobacco grower cash receipts. Nursery crops accounted for \$2.33 billion or 72 percent of the G/N receipts in the Southern region. The West was the second most important region last year with \$2.84 billion in grower cash receipts, up 3 percent. Nursery receipts in the West were moderately higher, but greenhouse receipts fell due to increasing import competition for cut flowers. The North East region receipts totaled \$1.23

³ See map attachment for States included in each region.

billion, up slightly from 1990. Greenhouse receipts were up moderately, but nursery crop receipts were off. The North Central region grower receipts increased 3 percent to \$1.08 billion. Greenhouse crop receipts rose 7 percent, but nursery crops were 1 percent lower.

Grower receipts in 1991 were very mixed by product category

Floricultural product (mostly greenhouse crops) grower receipts fared better during the recession of 1990-92 than did nursery or turfgrass grower receipts. However, grower receipts for cut flowers and foliage plants have trended downward over the past three years due to competitive factors while grower receipts for bedding and garden plants, potted flowering plants, cut greens, and unfinished greenhouse plants and related products have continued to trend upward. These trends are expected to continue next year with slight declines in domestic production of cut flowers and potted foliage plants.

Imports continue to take a larger share of the U.S. cut flower/cut green market

Although the retail floral market continues to rise, grower cash receipts for cut flowers and cut greens probably peaked in 1990 and are now on a downward track. Imports are continuing to increase their marketshares. Current year imports are projected to hit 3.9 billion stems, 5 percent higher than 1991, or more than 60 percent of the market. Per capita consumer expenditures reached an estimated \$24.25 in 1990, then fell slightly during 1991 and 1992, but are expected to rise again in 1993. In quantity terms (stems per capita), the market has continued to increase, but very modestly during the recession.

Potted flowering plant market and grower receipts continue strong

Grower cash receipts for potted flowering plants exceeded \$900 million in 1991, 7 percent higher than 1990, and are projected to increase another 7 percent this year and next, reaching nearly \$1.1 billion in 1993. Per capita consumer expenditures at \$16.20 are estimated to be twice the per capita expenditures in 1986. Expenditures have slowed in the 1990's, but are expected to continue rising at about \$1.00 more per person each year.

Potted foliage plant market and grower receipts continue to slip lower

Grower cash receipts for potted foliage plants peaked in the mid-80s at about \$600 million and have continued to slip lower each year even though export sales have made moderate gains. Small reductions in cash receipts for foliage growers are expected this year and into 1993. Per capita consumer expenditures for foliage plants reached \$10.60 in 1986 but have fallen to \$9.00 per capita in 1992. This trend is expected to continue as consumers will likely spend relatively more on cut flowers, flowering plants, bedding plants, and other horticultural products.

Bedding/garden plants continue to be the hottest sellers

Grower cash receipts for bedding and garden plants continue to rise faster than any other category of floricultural and environmental horticulture crops. Grower receipts exceeded the \$1.0 billion mark in 1990 and are projected to hit \$1.25 billion in 1993. Per capita expenditures for bedding and garden plants are estimated at \$17.10 in 1991 compared with \$10.40 in 1986. The 1993 per capita expenditures will be nearly double the 1986 consumption level.

Competitive factors are lowering prices and limiting receipts for environmental plant producers

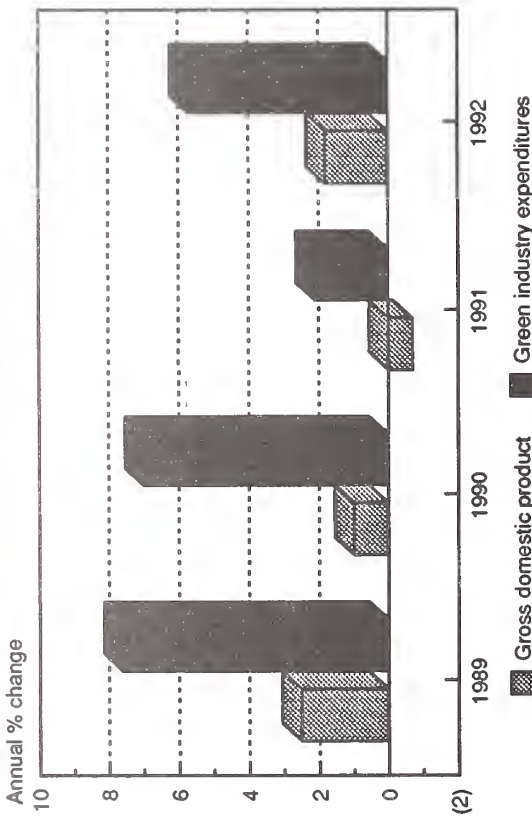
Nursery product and turfgrass producer sales have been significantly impacted by the sluggish economy and lack of residential and business construction. Grower cash receipts for environmental crops (nursery products, turfgrass, and bulbs) reached \$5.1 billion in 1991, a modest increase of 2 percent over 1990. In 1992, grower receipts for environmental plants should increase about 5 percent to \$5.4 billion and then are projected to increase nearly 10 percent in 1993 to \$6.0 billion.

Sales of sod and field grown nursery stock were effected the most in 1991 by the slow-down in retail demand while container grown landscaping plants fared better than most other types of nursery stock. However, the entire nursery and environmental plant sector has been affected by slower consumer demand which has led to a build-up in supplies, reduced unit sales, and heightened unit price competition which are limiting total receipts for all sellers in the marketing chain. Nursery plant and turf growers, wholesalers, landscapers, and retail garden center operators should see a moderate improvement in total units sold and prices for 1993. However, the turnaround is expected to be slow and uneven and will vary considerably by region depending on local economic conditions.

Future success of the U.S. Green Industry depends on research funding

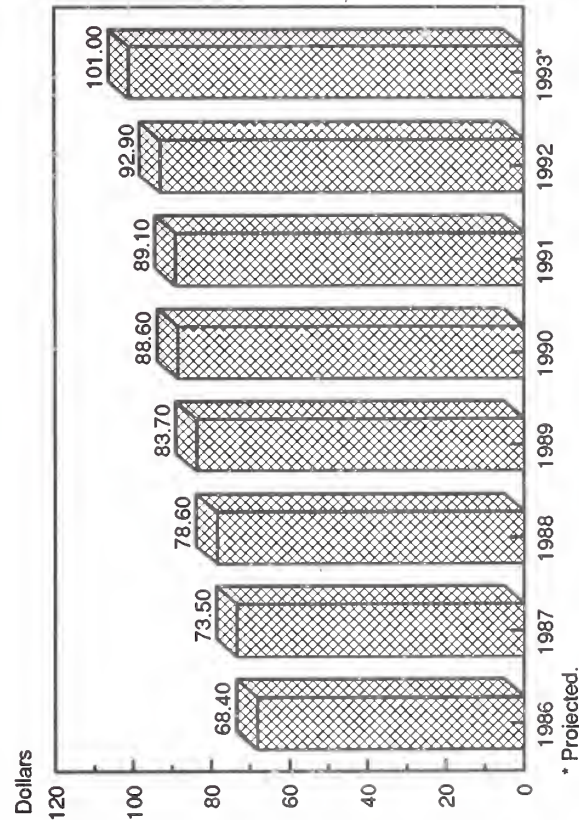
The nursery, floral, and turf industries have been challenged by another period of difficult production and marketing, but next year the financial road should begin to smooth-out and forward progress will be much easier. The U.S. Green Industry's success on this road ahead will depend on its ability to discern where it is and what course to take. Economic information can provide the best roadmap for the Green Industry to steer itself in the years to come. The future of the industry will hinge on the capture of an equitable share of the federally funded research dollars which now is a mere .02 percent!

**Annual Changes in Gross Domestic Product vs.
Annual Changes in Green Industry Expenditures 1/**



1/ Annual growth rates in constant 1987 dollars.

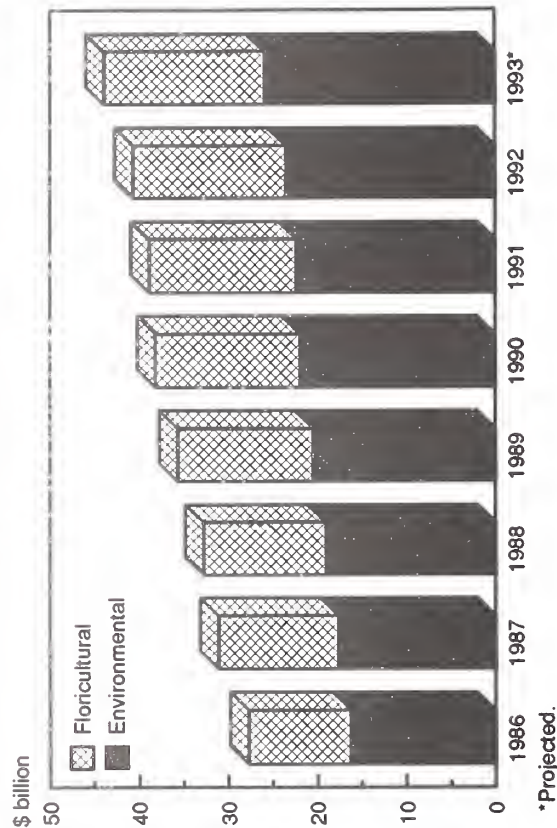
Environmental Plants: Per Capita Consumer Expenditures 1/



* Projected.

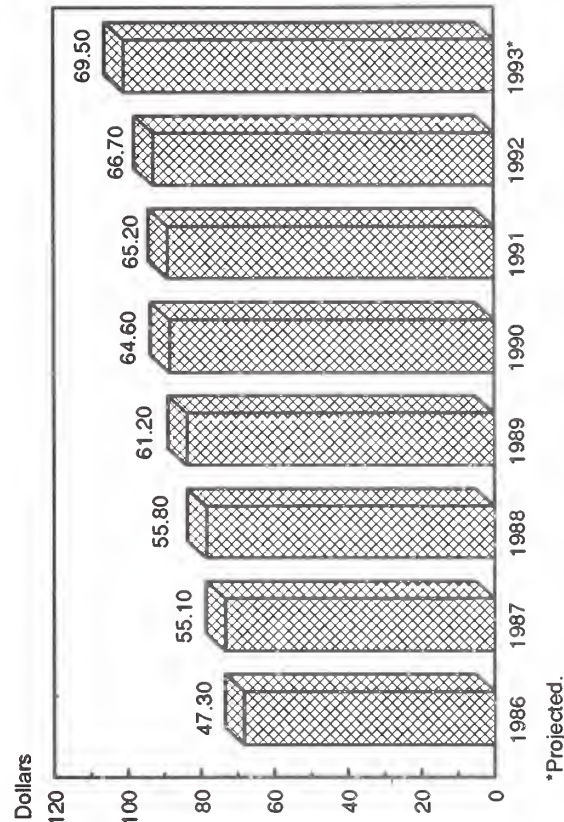
1/ Includes nursery plants, turfgrass, bulbs, unfinished products.

**Environmental and Floricultural Products:
Value of U.S. Consumer Expenditures**



* Projected.

Floricultural Plants: Per Capita Consumer Expenditures 1/



* Projected.

1/ Includes cut flowers/cut greens, potted plants, and bedding/garden plants.

CONSUMER EXPENDITURES: FLORAL & NURSERY PRODUCTS

\$40.7 billion in 1992

FLORICULTURE (\$17.0 billion) ENVIRONMENTAL HORTICULTURE (\$23.7 billion)

CUT FLOWERS/GREENS--\$6.0 billion SHADE/FLOWERING TREES-- 17-19%
 FLOWERING PLANTS--\$4.1 billion EVERGREENS-- 36-38%
 FOLIAGE PLANTS--\$2.3 billion TURFGRASS-- 16-19%
 BEDDING PLANTS--\$4.6 billion FRUIT/NUT PLANTS-- 8-10%
 BULBS-- 4-6%
 OTHER ENVIRONMENTALS-- 12-14%
 (Deciduous shrubs, roses, vines, groundcovers, unfinished plants)

GROWTH IN THE U.S. FLORAL MARKET

\$12.4 BILLION



1992

\$10.1 BILLION



1987

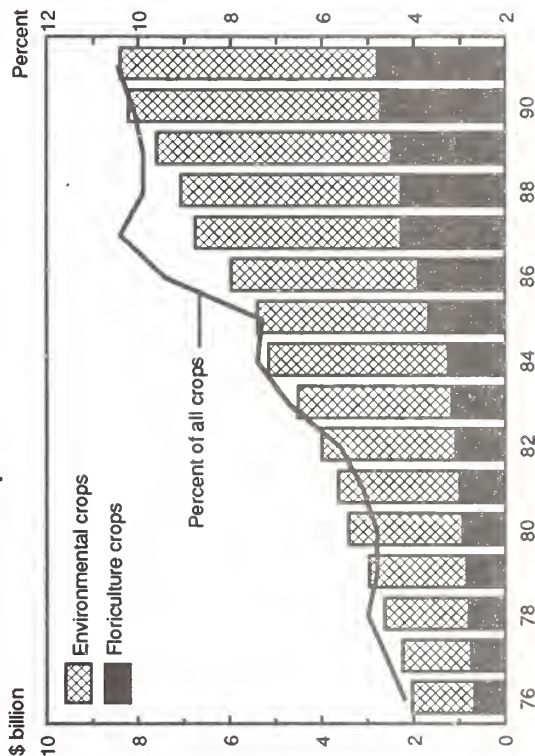
\$5.7 BILLION



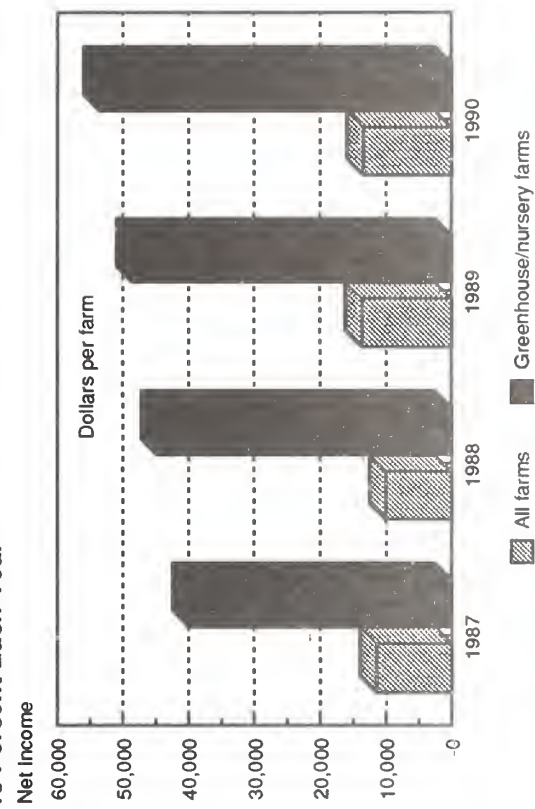
1982

Retail sales of cut flowers, green and blooming plants soared 77 percent from 1982-87, then 23 percent more from 1987-92! An increase of 118% in 10 years!

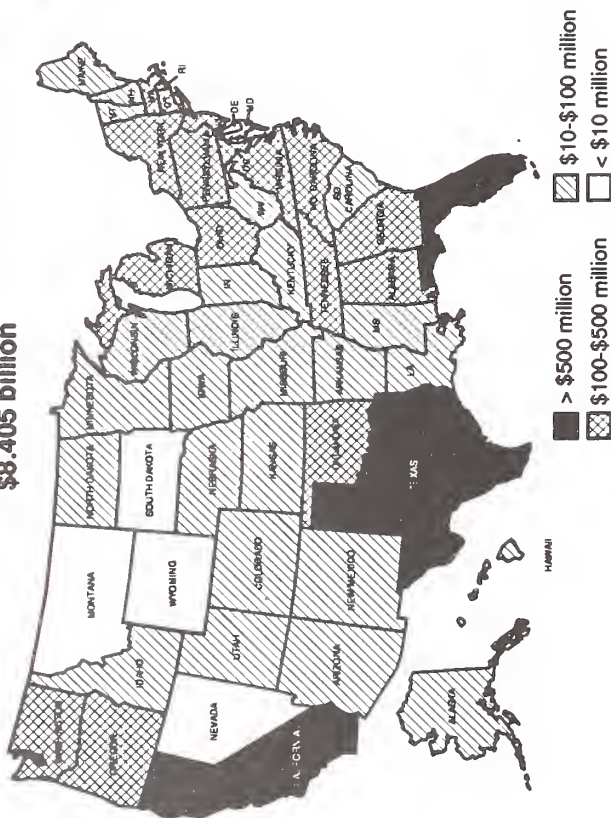
Greenhouse and Nursery Grower Cash Receipts and Percent of All Crops



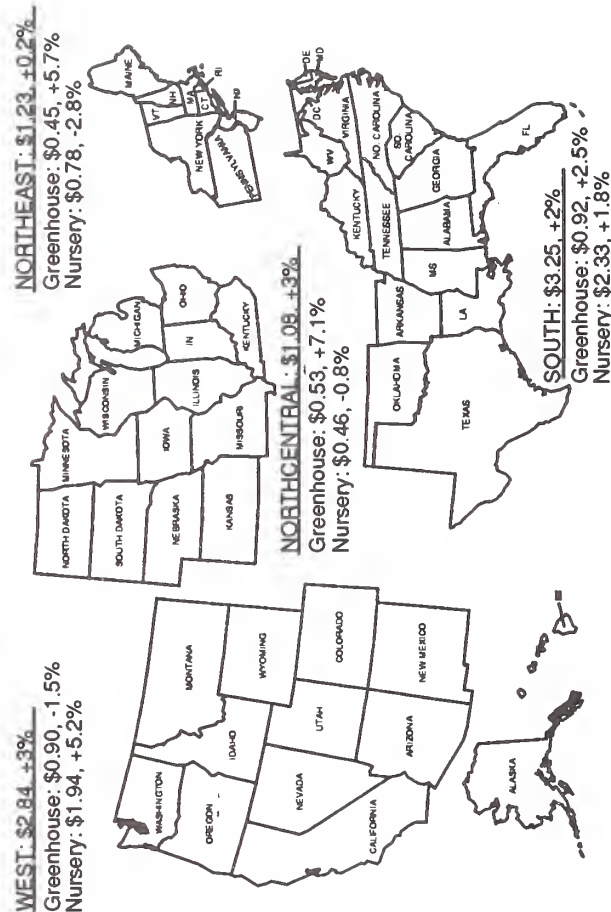
Greenhouse/Nursery Grower Income Rising 10 Percent Each Year



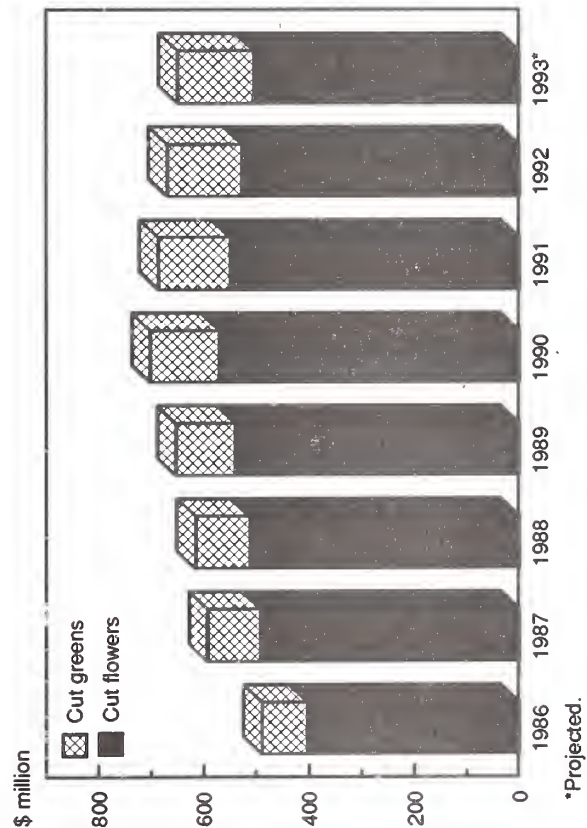
Grower Receipts for Greenhouse and Nursery Crops, 1991 **\$8.405 billion**



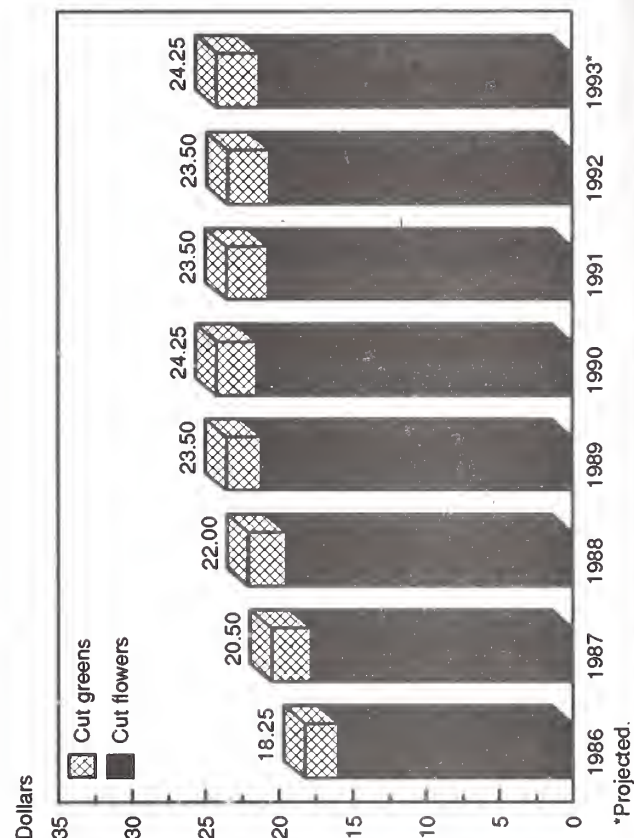
Greenhouse/Nursery Grower Receipts, \$8.4 billion in 1991



Cut Flowers/Cut Greens: **Value of U.S. Grower Cash Receipts**

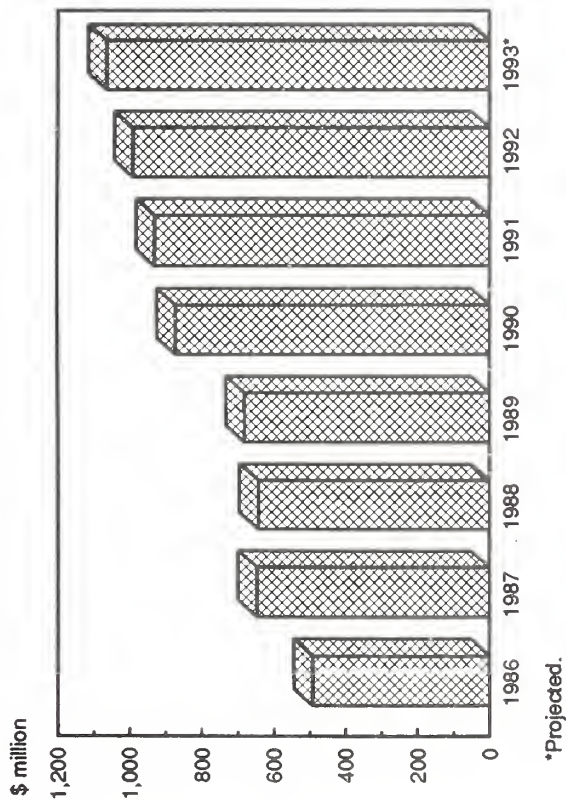


Cut Flowers/Cut Greens: Per Capita Consumer Expenditures

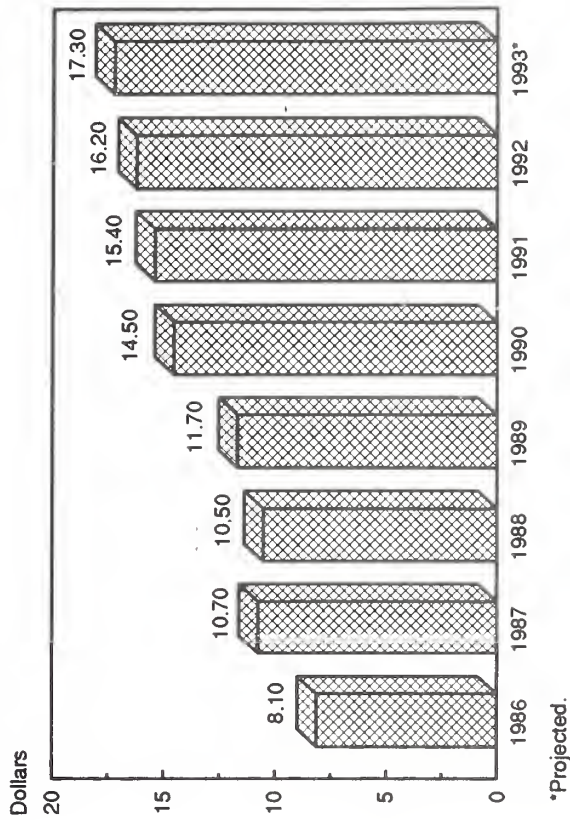


1993* 1992 1991 1990 1989 1988 1987 1986

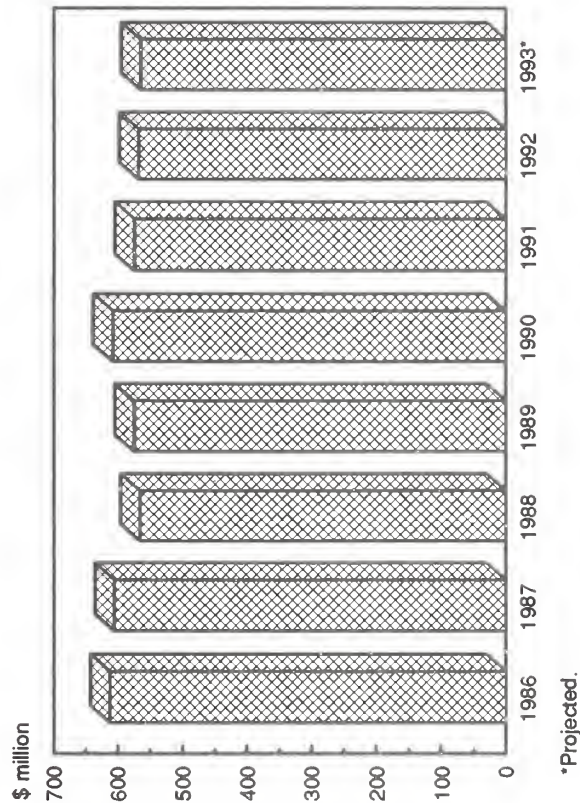
Potted Flowering Plants: Value of U.S. Grower Cash Receipts



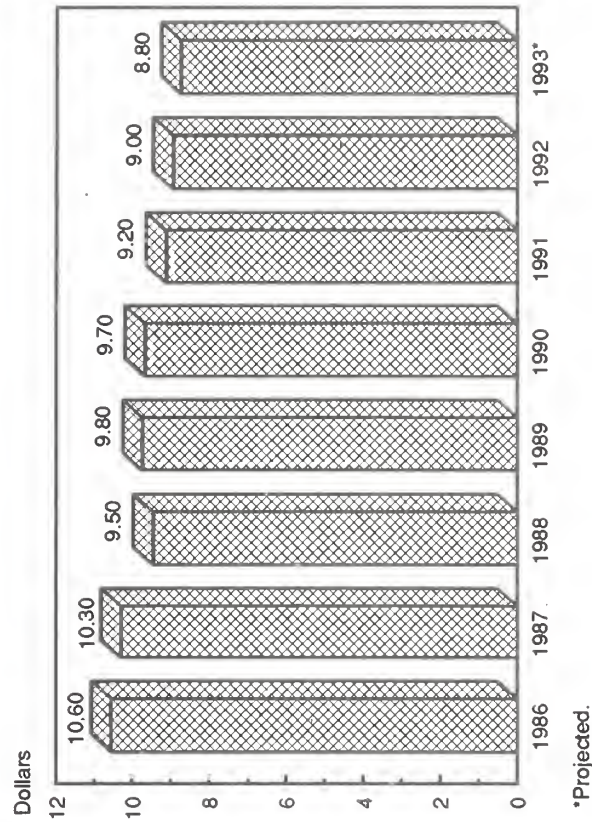
Potted Flowering Plants: Per Capita Consumer Expenditures



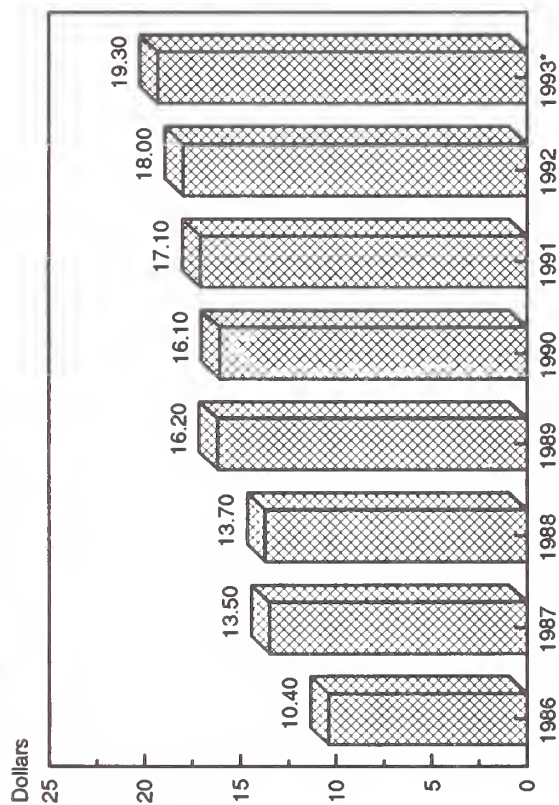
Potted Foliage Plants: Value of U.S. Grower Cash Receipts



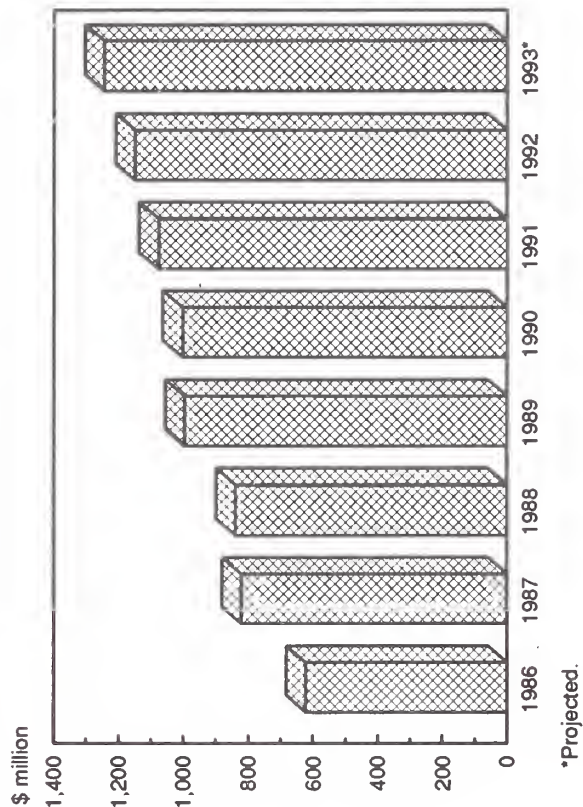
Potted Foliage Plants: Per Capita Consumer Expenditures



Bedding/Garden Plants: Per Capita Consumer Expenditures



Bedding/Garden Plants: Value of U.S. Grower Cash Receipts



Outlook '93

For Release: Wednesday, December 2, 1992

**THE NATIONAL PLAN FOR PRODUCTION AND MARKETING RESEARCH
FOR FLORIST AND NURSERY AGRICULTURE**

Dr. H. Marc Cathey
National Chair for Florist and Nursery Crops Review
Agriculture Research Service

Florist and nursery agriculture is classified as agriculture because it cultivates plants on 450,000 acres. The average net cash farm income is \$45,712, the highest among all farm production specialties. The National Chair was created to analyze the growth potential of these Green Industries.

THE SCIENCES

The accomplishments for agriculture has occurred in an environment of management I call SCIENCE FOR SCIENCE. The obligation of the scientist was to seek knowledge, often over many years, in a specific field. The prime objective was to learn how a particular system worked, then propose a theory as to how to prove it, setup replicated tests, collect and analyze the data, and publish in a referred journal the findings. The scientist did not write summaries for the lay/user audience nor did they do extensive presentations to the lay/user audience. The practical applications of any new information was left to others, particularly extension agents and salesmen, to make the information serviceable to the lay/user audience. Many discoveries from that era of science still remain unused, often published in journals distributed to only a few libraries, and contributor/members. There were not any national data banks--other than indexed cards in the hands of a few scientists. Computer and on-line systems only began in the late 1970's/early 1980's.

Many of the crops of florist and nursery agriculture have had detailed studies done on their genetics, rooting processes, growth and flowering, post production handling, and control of diseases, insects and stress. Some species dominate the literature--they include rose, carnation, chrysanthemum, poinsettia, petunia, and tulip for the florist industry and rhododendron and azaleas, elm, rose (landscape), magnolia, holly, yew, and crabapples for the nursery industry. There are hundreds of other species being marketed today with little or no genetic improvement, knowledge on the

culture, or their survival in the landscape. This is particularly true with our native plants (trees, shrubs, perennials, annual flowers), aquatics and wet-land plants, herbals, tropicals, alpine, and grasses.

In the 1980's, a new way of funding research emerged. I call it Survival Sciences--technology for compensation: Many facilities were not adequately funded beyond their basic salaries and overhead costs. In order to have graduate students and technicians working in the laboratory--it was essential for the lead scientist to receive grants from cooperating organizations. The projects that the cooperating organizations were interested in funding were not always the top priority, the best use, or the most productive avenue for the sciences and the scientists. The research was designed more to evaluate new products or to answer short term problems rather than to expand the fundamental basis of the sciences. No professional can sustain a life-long career with a series of focused, short term sources of funding. This science policy has resulted in the loss of the services of a number of promising scientists who should have continued on florist and nursery crops problems, but have shifted to research areas where funding is available.

The program planning proposed by the NATIONAL CHAIR FOR FLORIST AND NURSERY CROP REVIEW, (NPS, ARS, USDA) should help restore the FOCUS OF RESEARCH to BENEFICIAL SCIENCE--Research Advantageous to Society (to meet the interests of the consumer), Economy (to expand profitability), Export (to help balance trade payments), Enjoyment (to establish wellness), Excellence (to market highly desired plant products) and Environment (to sustain our world).

THE INDUSTRY

The RESEARCH PROGRAMS must become market driven. G. Carl Ball (Geo. J. Ball, West Chicago, IL) during the Chair's Convocation at the Chicago Botanic Garden (Glencoe, IL) recommended that The GREEN INDUSTRIES must continually prime the consumer with new products and processes. The primary focus of sales comes from the areas of current concerns such as drought and pest resistance, tolerances for cold and heat, and compact growth. Time-based management techniques will require that the GREEN INDUSTRIES respond quicker and with more comprehensive answers to the critical issues/opportunities. The industry must seek the research background to accelerate this process. Ed Bales of Motorola suggested that "time attracts costs," thus our green industries must cycle products more rapidly and effectively. In the electronics industries, for example, 55% of products offered each year had been introduced within the previous two years. Plant producers will have to restructure their production facilities for flexibility. The production must be organized around the flow of market information rather than around the flow of materials.

Any marketing process based on the flow of materials will require team work. It will begin with information from the sales floor. It must be

communicated in "real time" to the manufacturers plant. It should be automatically converted into a manufacturing schedule and delivery instructions: when to ship, what to ship, how to ship, and where to ship. The retail price of most products reflects a 20 to 30 percent cost of getting the merchandise from the manufacturer's loading dock to the retailer's store. Peter F. Drucker in the Wall Street Journal (September 24, 1992) suggests the "cost of keeping inventories in the manufacturer's, wholesaler's, and retailer's warehouses can largely be eliminated and enable companies to undersell local competitors despite its generally higher labor costs." Team work between all sectors of the GREEN INDUSTRIES should, in time, lower the costs of the products to the consumer and increase their quality as a result of more speedy handling.

Team work is also needed between the research scientists and the industries to take basic findings and translate them into practical practices for the GREEN INDUSTRIES. The pioneering work of Garner and Allard on photoperiodism has been translated into new year round products such as chrysanthemum, kalanchoe, poinsettia, and most bedding plants. The F-1 hybrids introduced into agriculture by such companies as Pioneer Seed and the Henry Wallace brought new products of excellence and productivity to American agriculture. The recent achievements with the rescue of hybrid New Guinea Impatiens and their wide acceptance by the public illustrates the team work between the scientists and the industry. Team work is needed between the industry and the consumer to teach them how to select and grow the new plant products and processes successfully. The garden centers of America must find and refine their missions to serve their customers. The strategic plans of many of our businesses are too rigid to make the adjustments to look at the "whole" story, not the parts.

THE CONSUMER

At the same convocation, Virginia Beatty (Beatty and Beatty, Evanston, IL) proposed that the consumer is the customer who is the opposite of the producer. They must meet, know, buy, and utilize the benefits that they can derive from plant products and services. At these meetings the why, who, when, and how must be met to achieve continuous sales and acceptance of what the florist and nursery crops provide. Since more than 80 percent of the businesses are owned by a family or a single entrepreneur--the successes are based more on experience than on specific marketing information about the consumer. As more larger marketing oriented firms begin to offer florist and nursery crops--the complexities and selling to both broad and niche markets will emerge. The GREEN INDUSTRIES must become market driven.

There are two separate consumer markets--Gardeners/growers, numbering no more than 2 million, purchases plants on many levels and areas of expertise. The gardener/growers market has long been the primary target of the florist and nursery agriculture. They identify their lives with

plants. They see their acts of caring and propagating plants, and their collections of plants, books, art, gardens, and scholarship as an appropriate use of times and resource. They can analyze and derive information even from the most technical publications and sources. Their actions and interests are often used to illustrate the elitism and private worlds of collectors/horticulturists and esthetes.

The non-gardener, numbering in the 80 millions, approaches plants and plantings without the interest in the special language or exclusive nature of horticulture/botany. They grow plants not for profit, not for the good of the individual. They grow plants to decorate an otherwise ugly world. They want to create an urban basis of plants, critters, lawns, and natural areas when they can escape the tensions of urban life. They must create these green spaces in their own surroundings because the truly pristine environment--if it exists anywhere--is too far away and require travel through too much traffic. They want lawns initially but soon look for alternatives for landscaping as the time available to garden continually is reduced. They "cut and paste" ideas on plants from all they see and do. The only information available to them are on the selling signs in the garden center, on the package of seed, or on the tiny 40 word care tags. The most critical information on the tag--where/how/distances/care--are buried on the tag underneath the growing media surface. They expect the plants to do better in the yard than they do in the nursery or garden center. They look for fun, variety, fragrance, durability, vivid/punch colors that will make it on its own terms. Their recent interests have been perennials, native plants, herbs, ornamental grasses, and aquatics. Their plants should have standard names, dated as to their saleability, in standard sizes based on the plant, not the container that it was marketed in. The plants, the garden tools, and the garden supplies should all have labels telling what they should be used for and how to use them safely and efficiently. This information is also needed on the full spectrum of gardening from seeds to container grown plants to B&B trees, to hoses and trowels, and to complete pesticide formulations.

The green industries have made great strides in making plants available year round which are less expensive, with greater uniformity, and better appearance. The new plant products must be based on the recent concerns of drought, soil compaction, chemical-free, and renewable resources. The information should be presented in a way that the claim that one Gerbera house plant will cleanse a living room of more than 400 kinds of air pollutants is backed up by solid, well substantiated data. The consumer has the feeling that many of the recent claims about plants are promotional rather than rooted in scientific facts. Mrs. Beatty thus sees the diversity of plants and services growing rapidly. She suggests that the size of the pie (the market) is growing much more rapidly than most professionals are aware of because there are so many sources, products, and services available in the urban areas--towns/cities/ jurisdictions.

Based on these 3 views and the inputs of 15 convocations across the United States with 400 participants from the GREEN INDUSTRIES--the research should be evaluated by:

EVALUATION OF CONVOCATIONS

- o Society benefits: Justifies investment to support even with diminishing research funds.
- o Product Quality: Performs to the full standards anticipated by the consumer.
- o Environment: Acts as the solutions to the maintenance of a sustainable system.
- o Economic: Provides the stimulus to support the development of a viable economy.
- o Export: Stimulates consumer interest across the world and provides funds to help the balance of payments.
- o Politics: Acquires the interest and support of the urban constituency to need the research benefits of urban agriculture in their daily lives and in their community.

RESEARCH PLAN (THE FIVE "E"S)

The research needs for florist and nursery agriculture were related to five major topics.

- I. Economics: Defining the business of florist and nursery agriculture.
- II. Environment: Defining how plants can create and sustain a healthy environment.
- III. Export: Defining how our expertise and climates can be combined to export world class florist and nursery products.
- IV. Enjoyment: Defining what the plant products should be and how should they perform to meet the needs of the number one hobbyist of America.
- V. Excellence: Defining how we can maintain the excellence of our plant products with the high risks of introduced pests.

- I. Economics: Our green industries must begin the process of identifying all of the contributions it makes to the U.S. economy. It goes way beyond the \$8.145 billion reported by USDA for the 1990 report. It also includes the service industries (grounds maintenance, trucking, interior design), supplies (media, fertilizers, containers, pesticides, furniture, irrigation systems), composting (removal and recycling of garden wastes), and construction organizations (greenhouses, gardens, public areas). Currently only 28 crops from 28 states, at a farm value of \$150,000 are reported. Thus, the full impact of florist and nursery agriculture are not being captured either from the great variety of jobs or from the many speciality crops, particularly from small farm operations.

Recommendations:

1. Seek comprehensive data base to identify the size and employment status of florist and nursery agriculture.
 2. Perform an audit of the facilities involved in producing the crops of florist and nursery agriculture and identify its impact on the tax basis of the country.
 3. Project what the needs will be for jobs, facilities, and land to sustain the projected growth of florist and nursery agriculture.
- II. Environment: Florist and nursery agriculture faces complex and expensive retrofit operations to bring its production facilities into the projected standards of zero impact on the surrounding environment. We do not even have systems in place to monitor many of the contaminants originating from other production facilities. All aspects of the production cycle of structures, watering systems, drainage systems, electrical and gas uses, media, containers, fertilizers, pesticides, conditioners, surfactants, and coverings need to be researched.

Recommendations:

1. Research is needed on how to build growing facilities (greenhouse, storage rooms, propagating structures) to meet the anticipated environmental standards.
2. Research is urgently needed to retrofit our 17,000 acres of protected culture (glass, plastic covered) to insure a zero impact production facilities.
3. Research is needed to reduce the energy requirements (gas, coal, oil, electricity, and labor) to produce and manage the crops economically as well as environmentally sound.

4. Research is needed to reduce specifically ground water contamination and pollution emitting from the business of florist and nursery agriculture.
5. Research is needed to identify the gases involved in the production of green plants in enclosed production spaces and in enclosed living spaces.

III. Export: The potential to export florist and nursery crops will require a totally new mind set for our research scientists, producing industries, and marketing organizations. The type of cooperative development that has brought success to the export of Dutch Iris bulbs from the northwest and acclimatized tropical foliage plants from Florida should serve as a model for all horticultural crops. Missing in many of our green industries are partnerships among our scientists, producers, and marketers. We must marshall our human resources to create total approaches where every player buys into the goals and the problem solving process. It will also mean the integration of a diverse workforce and innovation incentives to attract and retain key employees. Our industries must adopt standards for quality, seek ways to constantly improve them, and adjust/tract the performance of the green products as they meet the demands from a highly varied international market. We will need to strengthen our relationships with the consumer by the pursuit of innovation, needs-based selling systems, and target marketing programs. Our reliance on database technologies for monitoring inventories, customers, economy or market shifts must be established nationally for our export programs to be successful. We will need creative financing practices to support market expansion and investment strategies to maximize earnings and improve net worth. We will learn how to deal with many different kinds of currency. Contingency financial planning to survive during the inevitable cash flow situations will become part of our routine. The merger of facilities, people and processes to achieve increased output, timely and consistent delivery, and increased cost efficiency will be the desired goals for our TQM (total quality management) program for the export of green crops and products.

We will also have to seek product identity with trade marked names and logo's, information sheets, and promotional activities. As it now stands, the patent and variety protection extended to our recently introduced cultivars does not have automatic reciprocity in other countries around the world. Control and re-imbursement of intellectual properties around the world is a critical issue regulating international movement of horticultural crops. The other issue is the pest risk assessment of introducing exotic diseases and insects into the environment. All of these aspects must be decided and maintained by international diplomacy. Our agricultural products,

even in the conditions of today, are contributors to our balance of payments. Our horticultural crops can also play even a greater role in contributing to international trade.

Research horticulturists, by tradition, have always separated themselves from the marketing process of their products. This must change, otherwise, the new plant products and processes could be considered whimsy or fashion-driven.

Recommendations:

1. Research is needed to determine the pest risks involved in the marketing of plants overseas. The information involves support from the U.S. government that any individual firm does not have access to the pest risk assessments maintained by the government, the laboratory methods to identify the pest, and the measures required to free the plants from the undesired agent.
 2. Research is needed to define how to produce, handle, ship, and distribute florist and nursery crops that will complete successfully in world markets.
 3. Research is needed to identify the genetic composition of breeding lines and cultivars to aid in the protection of their intellectual properties. A facility is needed to house this information for future disputes on the rights to a specific gene, plant response, or plant.
 4. Research is needed to meet the international standards for media, packing materials, trade marks, care tags, pesticides, and modified atmosphere.
- IV. Enjoyment: Gardening is the number one hobby, being a part of almost 110 million homes, 50 million businesses and public buildings. The consumption of plants on a per capita basis is still relatively small, doubling to 13 flowers in 1990. Consumer enjoyment is in great jeopardy due to the rapid changes in the availability of environmentally acceptable pesticides and growing practices. The plants still must be blemish-free and possess enhanced keeping quality. The value preceptions of identifying quality products, how to produce these crops consistently year round and for many years continues to challenge the florist and nursery agriculture. The rules, availability of legal and safe pesticides, and the supporting product promotion are not available on a national level to help the sustained expansion of florist and nursery agriculture. The routes to introducing new "elite" cultivars have proven to be very difficult to manage on a national level. There are so many ways that new crops get to the consumer from many different sources and organizations.

Recommendations:

1. Research is needed on the PEOPLE-PLANT interactions to pave the way for the identification of the plant characteristics (color, form, name, fragrances, tactile, season change, fruit, berries) that trigger plant sales on a highly repetitive basis.
 2. Research is needed to insure that the great diversity of plant products meet the anticipated interests of the consumer. With thousands of species for potential analysis-post production practices must be identified for all of the florist and nursery crops.
 3. Research is needed to implement complete studies on how plants can be used to cleanse and restore the environment. All plans must play a role in recycling gases, nutrients, and water. Detailed studies are needed to trace these transformations and demonstrate these benefits (financial, environmental, sociology) to our consumers.
 4. Research is needed to implement the total recycling of plant parts (leaves, roots, trunks, stumps, fruits) packing and growing materials (paper wrappings, plastic films and containers).
 5. Research is needed to insure that the products of florist and nursery agriculture will not release organisms or genes into the environment that would change the balance, even on a community level.
 6. Research is needed to chart the natural constituents of plants so that rashes and toxicities are identified and dealt with prior to the marketing process. The safety of the product from nature or genetic engineering must never be questionable.
- V. Excellence: The top priority for the most critical research has always been pest control. The immediate impact of an insect, nematode, or disease is the most visual reason for the loss of a crop. We have accumulated a whole arsenal of defense methods. Sometimes a careful monitoring of the environment and sanitation are sufficient to control the spread of the problem. For many years elements such as copper, calcium and sulfur and botanicals such as pyrethrin and rotenone were the only control measures. Following World War II, many synthetic compounds were introduced which controlled a wide range of pests in extremely minute amounts. As our environmental agenda emerged, the costs of registering pesticides on florist and nursery agriculture--the so called "minor crops"--have escalated significantly over the past two decades. Many have been dropped because of the strict interpretation of the laws and the availability of new, more explicit evolution methods. We now face a situation that some of our most reliable measures such as benlate and

methyl bromide are facing removal from the market. We soon will not have an adequate arsenal of chemical control measures, legally registered, labeled, and distributed to manage the pest-risk potentials for the thousands of crop plants grown by florist and nursery agriculture.

Current examples of the lack of an action plan for national losses are:

White rust (*Puccinia horiana*) on chrysanthemum in California could wipe out a \$300 million industry. There are no effective fungicides available.

Sweet potato whitefly (*Bemisia tabaci*, Strain B) found all over the United States is transmitting crippling viruses which destroy the plants. A massive program on field crops is underway. Funds need to be allotted to florist and nursery entomologists.

Benlate—a widely used fungicide, when marketed in a flowable formulation has killed crops and contaminated the growing media and beds with the highly toxic substance(s). Already \$500 million in losses have been filed. Benlate has been withdrawn from the U.S. market for ornamental crops. There is no alternative chemical control chemical and no one knows how to detoxify the contaminated growing media.

SUMMARY

I. RESEARCH PRIORITIES for Florist and Nursery Agriculture THE GREEN INDUSTRIES

o PROFITABILITY:

- New plant Introductions
- Product/Production Development Systems
- Post Production Handling
- Export to the World Markets
- Energy/Fuel/Engineering/Conservation

o ENVIRONMENT:

- Water Management
- Pesticides/Alternatives/IPM
- Federal Regulations
- Regional Plant Evaluations
- Biomass/Recycling/Media/Nutrients

o ANALYSIS:

- Market Research: The Consumer
- Statistics: The Green Industries
- Systems Access: The Sciences

o RELATIONS:

- One Voice/One Agreed on Plan
- Involving: State and Federal Scientists
- Industry
- Funding Agencies: Federal, State, and Private.
- Consumer-oriented groups

II. RANKINGS: Based on Group Discussions

Overall: Societal Benefits

1. Benefits to the Economy:

- A. Export Potentials near and far.
- B. Statistical basis for justifications of investments in research.
- C. Profitability by creating jobs, land use, tax base, profits for 83,000 jurisdictions in the United States.
- D. Urban agriculture: Production vastly underdeveloped for potential markets acceptance.

2. Benefits to the Environment:

- A. Clear air, water, soils, and plant products.
- B. Active roles in restoring health of the landscapes and the wellness of the people.
- C. Sustainable systems which recycle the essential building blocks of life.
- D. Enhances the People-Plants interactions/support.

FORWARD PLAN

Based on these views (the Sciences, the Industries, the Consumers) and the inputs of 15 Convocations--a consensus panel of federal, state, and privately funded scientists will be creating a NATIONAL RESEARCH PLAN for the FLORIST AND NURSERY AGRICULTURE centering on systems for profitability and environmental. An analysis of the benefits of the plan to our economy, jobs created, and consumer impact will also be issued. Opportunities to be issued April 1993. A 4-page summary with anticipated costs will also be prepared for the GREEN COALITION to seed public and private support as ONE VOICE.

Outlook '93

For Release: Wednesday, December 2, 1992

NEW DEVELOPMENTS IN WORLD FLORICULTURE MARKETS

Harry K. Tayama
Executive Director, Ohio Florist's Association

I. Introduction

- A. To be certain, trends in floriculture crops production, on a global basis, have been enormously dynamic during the past four decades.
 - 1. West Germany's floriculture production area in 1950 was more than double that in Holland. In 1991, the greenhouse area in Holland is over 70% greater than in West Germany. This turn around is not surprising when one considers that West Germany's consumption of **imported** floriculture products has increased by over 150% since 1970.
 - 2. Increases in flower production in Holland, Central America (Colombia), and Israel have been very significant since 1960. Today, however, there is a definite leveling off in Holland and Israel.
 - 3. A significant percentage of carnations (75 + %), pompon chrysanthemums (75 + %), and roses (40 + %) consumed in the United States in 1991 were imported.
 - 4. The dynamics of trends during the past 40 years will intensify as we will witness additional changes that will occur much more rapidly.
 - 5. **This subject will be addressed in this presentation.**
- B. The population of the world continues to increase even though several countries have instituted birth control programs.
 - 1. Medical advances have played a significant role in increasing world population. These medical advances will continue to impact world population, as fewer infants die at birth and more preventives and cures for diseases are discovered, resulting in increased longevity.
 - 2. Increases in population for regions and countries of the world will not be uniform. On a percentage basis, some countries will experience a decline in population increase, while other countries will have significant increases.
 - 3. Where people reside (urban or rural) within a country will also change with time.
 - 4. **These matters will be discussed as a part of this seminar.**

- C. Per capita consumption of floriculture products is increasing in the United States and other industrialized countries.
 1. This increase will continue in industrialized countries.
 2. As Eastern European countries become financially stable, their per capita consumption is expected to increase.
 3. Pacific Rim countries are experiencing an enormous growth in technological advances, manufacturing, and exporting, as the world continues to shrink. The peoples of these countries should begin to purchase more floriculture products.
 4. Discussions on per capita consumption of flowers will be a focus of this paper.
- D. The presentation will conclude with a discussion regarding:
 1. Marketing studies/research
 2. Developing a channel of distribution
 3. Acquiring production technology
 4. Acquiring postproduction care and handling technology
 5. Developing service skills

II. Trends in global floriculture production from the 1980s to 2000.

- A. Table 1. Current estimates of fresh cut-flower production area (hectares) for 45 nations of the world.

Nation	Hectares	% of total	Cumulative %
Japan	13,976	23.4	23.4
Italy	7,600	12.7	36.1
Netherlands	5,081	8.5	44.6
United States	5,067	8.5	53.0
Mexico	4,250	7.1	60.2
Spain	2,900	4.8	65.0
West Germany*	2,538	4.2	69.2
Colombia	2,122	3.5	72.8
France	1,692	2.8	75.6
Israel	1,483	2.5	78.1
Greece	1,430	2.4	80.5
Australia	1,111	1.9	82.4
Brazil	1,000	1.7	84.0
Costa Rica	800	1.3	85.4

Czechoslovakia	650	1.1	86.5
Poland	629	1.1	87.5
East Germany*	591	1.0	88.5
Guatemala	500	0.8	89.3
Canada	493	0.8	90.2
Thailand	432	0.7	90.9
Honduras	400	0.7	91.5
Egypt	345	0.6	92.1
United Kingdom	344	0.6	92.7
Hong Kong	343	0.6	93.3
Portugal	308	0.5	93.8
Morocco	300	0.5	94.3
Soviet Union	300	0.5	94.8
Yugoslavia	300	0.5	95.3
Jamaica	300	0.5	95.8
Switzerland	280	0.5	96.3
Denmark	251	0.4	96.7
Kenya	246	0.4	97.1
Belgium	215	0.4	97.5
Bulgaria	200	0.3	97.8
Romania	200	0.3	98.1
Hungary	200	0.3	98.4
Peru	175	0.3	98.7
Singapore	150	0.3	99.0
Sweden	130	0.2	99.2
Indonesia	128	0.2	99.4
Ivory Coast	100	0.2	99.6
Finland	74	0.1	99.7
Dominican Republic	60	0.1	99.8
Norway	52	0.1	99.9
Tunisia	30	0.05	99.9
Ireland	27	0.05	100.0
Total	58,803	100.0	100.0

B. Table 2. Current fresh cut-flower production area (hectares) throughout the world for selected species.

Fresh Cut-flower Production Area (Hectares)					
Country	Rose	Carnation	Chrysanthemum	Orchid	Gladiolus
Japan	344	456	4,864	65	307
Italy	812	1,950	1,028	\1	1,211
Netherlands	829	287	625	177	\1
U.S.A	377	235	337	15\2	2,590
Mexico	50	3,500	200	\1	500
Spain	523	1,085	\1	\1	\1
West Germany*	420	117	530	32	86
Colombia	275	1,050	600	\1	\1
France	406	147	76	\1	369
Israel	140	259	17	\1	39

\1 Data not currently available.

C. Where will the floriculture production centers be located after 1992?

1. Spain and Italy have experienced significant increases in floriculture crops production as a result of the pending formation of the European Community in 1992. This is beginning to slow because there is an over supply of flower at the present time. Spain experienced a 66% decline in production during the past three years.
 - a. Favorable climate for flower production
 - b. Cost of labor less than in northern European countries
 - c. Satisfactory labor force (quantity and quality)
 - d. Low land cost
 - e. Government cooperation
 - f. An excellent channel of distribution
 - g. Production and postproduction technology is questionable
2. Mexico is and will continue to experience significant increases in floriculture crops production as a result of:
 - a. Favorable climate for flower production
 - b. Cost of labor much less than in the United States or Canada

- c. Satisfactory labor force (quantity and quality)
 - d. Low land cost
 - e. Government cooperation is improving
 - f. Channel of distribution currently questionable
 - g. Production and postproduction technology is questionable
3. South Africa, Africa, Australia, New Zealand, Venezuela, Ecuador
- a. Favorable climate for flower production (winter/summer)
 - b. Cost of labor much less than in the northern hemisphere
 - c. Satisfactory labor force questionable (Africa)
 - d. Low land cost
 - e. Government cooperation is improving
 - f. Channel of distribution currently questionable
 - g. Production and postproduction technology questionable
4. Indonesia, Malaysia, Thailand, Taiwan, Singapore, Philippines
- a. Favorable climate for flower production questionable (species/varieties)
 - b. Cost of labor much less than in Japan, South Korea, and Hong Kong, except for Taiwan and Singapore
 - c. Satisfactory labor force questionable
 - d. Low land cost, except for Singapore and Taiwan
 - e. Government cooperation questionable
 - f. Channel of distribution questionable
 - g. Production and postproduction technology questionable
5. Colombia
- a. Suffering from drought and electricity shortage
 - b. Labor costs are increasing
 - c. Transportation limited to markets outside North America

III. Population growth from 1980 to 2000

A. Table 3. Population for selected countries, 1980, 1990, and 2000 (millions).

Country	1980	1990	2000	Percent Growth 1980 to 2000
Argentina	28.2	32.9	37.2	32%
Australia	14.7	16.7	18.6	27%
Austria	7.5	7.5	7.5	0%
Belgium	9.9	9.9	10.0	2%
Brazil	121.3	150.4	179.5	48%
Canada	24.1	26.7	28.9	20%
Chile	11.1	13.0	14.8	33%
China	996.1	1123.8	1255.9	26%
Colombia	25.8	31.8	38.0	47%
Cuba	9.7	10.5	11.7	20%
Denmark	5.1	5.1	5.1	-1%
Ecuador	8.1	10.8	13.9	72%
Egypt	41.5	52.5	63.9	54%
Finland	4.8	5.0	5.1	6%
France	53.7	55.5	57.2	6%
Greece	9.6	10.1	10.4	8%
Hong Kong	5.0	6.0	6.8	34%
India	688.9	827.2	964.1	40%
Indonesia	151.0	181.5	211.4	40%
Iran	38.6	51.3	65.2	69%
Ireland	3.4	3.8	4.3	27%
Israel	3.9	4.6	5.3	37%
Italy	57.1	57.6	58.6	3%
Japan	116.8	123.9	129.7	11%
Rep. Of Korea	38.1	44.8	51.0	34%
Dem. Peo. Rep. Korea	18.0	22.9	28.2	56%
Madagascar	8.7	11.6	15.6	79%
Mexico	69.4	89.0	109.2	57%
Morocco	19.4	24.6	29.5	52%
Nepal	14.7	18.5	23.0	57%
Netherlands	14.2	14.7	15.1	7%
Norway	4.1	4.2	4.2	3%
Pakistan	86.1	112.2	141.0	64%
Peru	17.3	22.3	28.0	62%
Philippines	48.3	60.9	74.1	53%
Poland	35.6	38.5	40.8	15%
Portugal	9.9	10.5	11.2	13%
Saudi Arabia	9.4	14.0	19.8	112%
Singapore	2.4	2.7	2.9	22%
South Africa	28.6	36.8	46.9	64%
Soviet Union	265.5	291.8	314.7	19%
Spain	37.4	39.7	42.2	13%
Sri Lanka	14.8	17.5	19.6	32%
Sweden	8.3	8.3	8.2	-2%
Switzerland	6.3	6.4	6.3	0%

Thailand	46.5	55.7	65.5	41%
Turkey	44.5	54.6	65.4	47%
United Kingdom	55.9	56.2	56.4	1%
United States	227.7	248.4	268.2	18%
Venezuela	15.0	19.7	24.7	65%
West Germany	61.6	60.3	59.5	-3%

B. Table 4. World population (millions) and population distribution by region for the years 1980 and 1990, and forecasts for 2000.

Region	Population for Years		
	1980	1990	2000
World	4,450	5,246	6,122
Africa	479	645	872
South America	361	451	546
North America	252	275	297
East Asia	1,176	1,324	1,475
South Asia	1,408	1,734	2,074
Europe	485	499	512
Oceania	23	26	30
USSR	265	292	315

C. Table 5. Percent distribution of world population by region for the years 1980 and 1990, and forecasts for 2000.

Region	Population for Years		
	1980	1990	2000
World	100.0%	100.0%	100.0%
Africa	10.8%	12.3%	14.2%
South America	8.1%	8.6%	8.9%
North America	5.7%	5.2%	4.9%
East Asia	26.4%	25.2%	24.1%
South Asia	31.6%	33.1%	33.9%
Europe	10.9%	9.5%	8.4%
Oceania	0.5%	0.5%	0.5%
USSR	6.0%	5.6%	5.1%

D. Table 6. Total, urban and rural world population (millions) by region, for the years 1980 and 1990, and forecasts for 2000.

Region		Population for Years					
		1980	%	1990	%	2000	%
World	Urban	1,764	40%	2,234	43%	2,854	47%
	Rural	2,685	60%	3,012	57%	3,268	53%
	Total	4,450	100%	5,246	100%	6,122	100%
Africa	Urban	129	27%	210	33%	340	39%
	Rural	350	73%	435	67%	532	61%
	Total	479	100%	645	100%	872	100%
Latin America	Urban	236	65%	325	72%	420	77%
	Rural	125	35%	126	28%	127	23%
	Total	361	100%	451	100%	546	100%
Northern America	Urban	186	74%	204	74%	223	75%
	Rural	66	26%	71	26%	75	25%
	Total	252	100%	275	100%	297	100%
East Asia	Urban	331	28%	391	30%	485	33%
	Rural	846	72%	933	70%	990	67%
	Total	1,176	100%	1,324	100%	1,475	100%

Population for Years

Region		1980	%	1990	%	2000	%
Asia	Urban	358	25%	524	30%	757	36%
	Rural	1,050	75%	1,209	70%	1,317	64%
	Total	1,408	100%	1,734	100%	2,074	100%
Europe	Urban	340	70%	363	73%	385	75%
	Rural	144	30%	135	27%	128	25%
	Total	485	100%	499	100%	512	100%
Oceania	Urban	16	70%	19	70%	21	70%
	Rural	7	30%	8	30%	9	30%
	Total	23	100%	27	100%	30	100%
U.S.S.R.	Urban	167	63%	197	67%	223	71%
	Rural	98	37%	95	33%	92	29%
	Total	265	100%	292	100%	315	100%

IV. Per capita consumption of floral products has and continues to increase in many countries. There are many more countries that will demand flowers and become purchasers of floral products.

A. Table 7. Relationship of number of retail outlets to per capita floral consumption (fresh cut-flowers) for selected countries.

Country	Population in millions (1985 estimates)	Number of retail outlets ^y (1987)	Retail outlets per million population	Per capita consumption (1988 \$U.S.)
Belgium/ Luxemb.	9.9	5,500	556	24.50
Denmark	5.1	1,100	216	23.50
France	54.6	13,000	238	22.50
Great Britain	56.1	5,000	89	8.50
Italy	57.3	N/A	N/A	32.50
Japan	120.7	23,000	191	40.00
Spain	38.5	4,600	119	7.00
Sweden	8.4	1,800	214	28.00
Switzerland	6.4	2,000	313	36.50
Netherlands	14.5	11,000	759	35.00
USA	238.0	35,000	147	19.50
W. Germany	60.9	20,000	328	31.00

y Retail florists type outlets only. Does not include mass market floral outlets.

- V. Marketing studies/research must be conducted.
 - A. Selling versus marketing
 - B. Market research
 - 1. Determine potential for sales of floriculture products
 - 2. What crops are in demand (present and future)?
 - 3. What quantities are required?
 - 4. What sizes are desired?
 - 5. What time of year are specific crops desired?
 - 6. What colors are desired and at what time of the year?
 - 7. What age group is/will be purchasing flowers?
 - 8. What sex is purchasing flowers?
 - 9. What price range is desired?
- VI. Developing a channel of distribution
 - A. To the United States, Canada, Japan, Europe
 - 1. Improve speed of delivery
 - 2. Require government cooperation
- VII. Acquiring production technology
 - A. Education, education, education is of paramount importance. There is no substitute. It must be continuous.
 - 1. Study abroad
 - 2. Intern abroad
 - a. United States, Holland, Denmark
 - B. The government must provide cooperation
 - 1. Academics
 - a. Teaching
 - b. Research
 - c. Extension

2. Investment capital
3. Tax incentives
4. Transportation (surface and air)
5. Import restrictions

XIII. Acquiring postproduction technology

A. Education, education, education

- B. In the United States, it is estimated that over 10% of all harvested floriculture products is lost because of unsatisfactory care and handling techniques.

Table 8. Comparison of population age distributions between the populations of the United States, Europe, and Japan.

United States

----- Year -----			
Age group	1980	1990	2000
Under 15	22.5%	22.0%	21.7%
15-29	27.4%	23.1%	20.1%
30-44	19.2%	24.1%	23.5%
45-59	15.1%	14.6%	19.0%
60 and above	15.7%	16.2%	15.7%
Total	100.0%	100.0%	100.0%
Total Population (Millions)	227.7	248.0	268.1

Europe

----- Year -----			
Age group	1980	1990	2000
Under 15	22.3%	20.1%	19.3%
15-29	23.3%	22.5%	20.0%
30-44	19.8%	21.6%	22.0%
45-59	17.7%	17.4%	18.9%
60 and above	16.9%	18.4%	19.8%
Total	100.0%	100.0%	100.0%
Total Population (Millions)	483.9	499.5	513.1

Japan

Age group	Year		
	1980	1990	2000
Under 15	23.6%	18.6%	18.2%
15-29	21.5%	22.0%	17.6%
30-44	24.2%	22.4%	20.7%
45-59	17.9%	20.4%	20.6%
60 and above	12.9%	16.6%	22.9%
Total	100.0%	100.0%	100.0%

Table 9. The top 25 economies of the world as measured by gross domestic product, GDP.

Country	1988 GDP (billions)	Average annual % change in GDP (1984-1988)
United States	4,864.3 y	3.4%
Japan	2,858.9 y	4.4%
West Germany	1,208.3 y	2.4%
France	945.9	2.4%
Italy	828.8	3.0%
Britain	812.1	3.5%
Canada	486.5	4.1%
Brazil	384.6	4.8%
China	370.6	10.6%
Spain	342.3	3.8%
Iran	338.4	-0.5%
India	283.8	6.2%
Australia	246.0	3.9%
Netherlands	230.2 y	2.2%
Switzerland	184.8	3.0%
Mexico	181.2	0.1%
Sweden	178.5	2.0%
South Korea	164.6	10.0%
Belgium	152.0 y	2.2%
Austria	126.6	2.4%
Taiwan	116.2	8.5%
Denmark	107.8	1.7%
Finland	104.2	3.5%
Norway	88.1	2.9%
Saudi Arabia	74.5	-1.6%

y Gross national product (GNP). GNP includes GDP plus output produced by domestic production factors in foreign lands.

Table 10. The international trade of fresh cut-flowers valued in million U.S. dollars

Region	Nation	Import value	%	Export value	%
European Community	Belgium/Luxbg.	45.7	2.2%	1.9	0.1%
	Denmark	37.4	1.8%	1.9	0.1%
	France	199.3	9.6%	16.9	0.9%
	West Germany	817.8	39.4%	11.3	0.6%
	Greece	0	0.0%	3.8	0.2%
	Ireland	8.3	0.4%	0	0.0%
	Italy	64.3	3.1%	92.1	4.9%
	Netherlands	110.0	5.3%	1,323.1	70.4%
	Spain	8.3	0.4%	43.2	2.3%
	United Kingdom	170.2	8.2%	7.5	0.4%
Sub-total		1,461.3	70.4%	1,501.7	79.9%
Rest of Europe	Austria	60.2	2.9%	0	0.0%
	Finland	10.4	0.5%	0	0.0%
	Norway	27.0	1.3%	0	0.0%
	Sweden	51.9	2.5%	0	0.0%
	Switzerland	112.1	5.4%	0	0.0%
Sub-total		261.6	12.6%	0	0.0%
The Americas	Colombia	0	0.0%	172.9	9.2%
	Canada	37.4	1.8%	13.2	0.7%
	United States	242.9	11.7%	5.6	0.3%
	Sub-total	280.3	13.5%	191.7	10.2%
Africa and Israel	Canary Islands	0	0.0%	20.7	1.1%
	Kenya	0	0.0%	26.3	1.4%
	Israel	0	0.0%	109.0	5.8%
	Sub-total	0	0.0%	156.0	8.3%
Far East	Hong Kong	8.3	0.4%	0	0.0%
	Japan	58.1	2.8%	0	0.0%
	Singapore	6.2	0.3%	5.6	0.3%
	Taiwan	0	0.0%	5.6	0.3%
	Thailand	0	0.0%	18.8	1.0%
Sub-total		72.6	3.5%	30.0	1.6%
Total		2,075.8	100.0%	1,879.4	100.0%

IX. Conclusion

A. The future of the floriculture industry

1. There is no reason to believe that the enormous increase in per capita consumption of floriculture products experienced during the past four decades will not continue throughout the world.
2. The most significant increase most likely will occur in areas of the world such as Mexico, Japan, China, Korea, Eastern European countries, Australia, New Zealand, Republic of South Africa, and South Asia.
 - a. A very recent study conducted by the National Aeronautics and Space Administration (NASA) of the United States reports that a huge market for travel to Pacific Rim countries is expected to open by the year 2000. To prepare for this market, Boeing Company, Seattle, Washington, and McDonnell Douglas Corporation of St. Louis, Missouri, U.S.A., are developing a high speed airplane that will travel at Mach 3, three times the speed of sound (2,250 - miles per hour) and seat 300 - passengers. Travel time from Los Angeles to Tokyo will be four hours at Mach 3 instead of the present 10 hours in a Boeing 747.
 - b. An underlying factor regarding future production areas for floriculture crops is government cooperation.

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Outlook '93

For Release: Wednesday, December 2, 1992

FEDERAL LEGISLATIVE INITIATIVES AND NATIONAL TRENDS
IMPACTING THE NURSERY INDUSTRY

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American Association of Nurserymen

THE AMERICAN ASSOCIATION OF NURSERYMEN (AAN)

The American Association of Nurserymen (AAN) is the national trade organization of the nursery industry. AAN directly represents nearly 3,000 members in both the United States and Canada. We represent an estimated 16,000 additional family farms and small businesses through the state and regional nursery and landscape associations.

Founded 117 years ago in 1875, AAN has a distinguished history. The nation's first Secretary of Agriculture was a two-term AAN president. AAN led the famed "Victory Garden" program during World War II, and was a recognized leader in the "Highway Beautification" movement overseen by Lady Bird Johnson. AAN was responsible for initiating the commercial plant quarantine system as it exists today. Most recently, AAN played a major leadership role in the development and enactment in 1990 of both the "America the Beautiful" and the Small Business Administration tree planting programs.

DIVERSITY OF THE NURSERY INDUSTRY

To truly appreciate the degree to which federal legislative issues impact the nursery industry, it is important to understand who the nursery industry really is. There is perhaps a single word which comes the closest to capturing its total scope and personality. That word is "diversity." The nursery industry is diverse. It is composed of family farms and small businesses in three major segments: nursery crop farmers or growers, landscape specialists and garden center retailers. Many are vertically integrated nurseries engaged in two or even all three operations.

Unlike most agricultural segments, the nursery industry does not receive -- and does not seek -- any direct federal subsidies, price supports or export enhancements. Yet, the nursery industry's growth rate remains one of the fastest in all of American agriculture.

ture

USDA's Economic Research Service (ERS) estimates farmer cash receipts of nursery and greenhouse crops in 1991 were \$8.7 billion. ERS states that the nursery and greenhouse industry accounts for 10 percent of all farm crop cash receipts -- ranking ahead of such major plant crops as wheat, cotton or tobacco. At the retail level, ERS estimates the nursery and greenhouse industry accounted for \$38 billion in consumer expenditures in 1990. Growers, landscape specialists and retailers are estimated to employ more than 600,000 people in the United States.

Nursery growers are diverse. Unlike traditional farmers, they often produce hundreds or even thousands of plant varieties on farms ranging from a few acres to hundred of acres. Production techniques are diverse with nursery crops grown in open fields and farms and in greenhouses; in the ground and in containers. Of course, nursery crops themselves are diverse -- everything from shade and fruit trees to palms and pines; from azaleas and rhododendrons to junipers and rosebushes; and, from indoor foliage plants to outdoor bedding plants.

The growing times are diverse: from one season to as many as seven to ten years or longer to reach the desired marketable size and quality. And throughout this time, these crops are subject to the vagaries of weather, disease and pest infestations. The fact that USDA now recognizes 11 plant hardiness zones reflects the diversity of this nation's climate with which nursery farmers and home gardeners must contend.

The landscape segment of the nursery industry is also diverse with landscape architects and designers, installers and contractors. There are professionals who specialize in residential landscapes and others whose expertise rests with commercial settings. And, there are interior and exterior landscape professionals. Within the retail segment of the nursery industry, there are independent garden centers, chain stores with multiple outlets, and mass merchandisers.

AAN'S FEDERAL LEGISLATIVE ACTIVITIES

Given the nursery industry's diversity, the scope of federal legislative and regulatory issues impacting it is very broad. These include agricultural, environmental and research issues, such as water and pesticides, as well as the full gamut of labor, tax and small business issues. It should not come as a surprise, then, to learn that AAN and the nursery industry were involved in no less than 215 pieces of federal legislation in 66 different policy issue areas during the 102nd Congress.

Rather than providing a laundry list, I wish to focus on three major federal legislative issues currently impacting the nursery industry. I will then identify certain significant national trends which we expect will further impact the nursery industry and shape its future federal legislative agenda.

PREEMPTION OF PESTICIDE ORDINANCES

One of the most dramatic consequences facing the nursery industry today arises from last year's U.S. Supreme Court's Casey decision which ruled that the Federal Insecticide, Fungicide & Rodenticide Act (FIFRA) does not prohibit local governments from regulating pesticide use. Prior to this landmark decision, both the courts and Congress had recognized that only federal and state governments had such authority.

With this decision, the U.S. Supreme Court sent a green light to the 83,000 local jurisdictions in this nation that they may begin establishing ordinances governing virtually all aspects of pesticides -- posting and notification; pesticide sales and storage; record-keeping and shipment; and, application permits and bans. For growers with farms in different counties or towns, landscape firms with projects in different cities or service areas, and garden centers with outlets in neighboring counties, the practical implication will be to require them to comply with -- and keep informed of -- potentially conflicting and changing ordinances from one jurisdiction to the next.

In order to avoid the imposition of a national patchwork of differing local pesticide ordinances, AAN and 185 other national and state associations formed a coalition (Coalition for Sensible Pesticide Policy) to develop federal legislation allowing the states to preempt local pesticide ordinances. The bills (H.R.3850 and S.2085) were introduced in the 102nd Congress and attracted 97 cosponsors in the House of Representatives and 22 in the Senate. However, this and other FIFRA legislation did not pass Congress. This pesticide preemption issue remains a high nursery industry priority for the 103rd Congress.

MINOR USE PESTICIDES

There is another equally important pesticide issue which cuts to the core of the nursery industry -- the minor use pesticide problem. In its 1988 FIFRA amendments, Congress required the Environmental Protection Agency (EPA) to re-register by 1997 all pesticides which came on the market prior to 1984. An unintended consequence of these amendments is that chemical manufacturers are beginning to voluntarily cancel pesticides used and needed by so-called minor users, such as the nursery industry. They are not being cancelled for reasons of safety,

rather the costs of some of the necessary re-registration tests required by EPA far outweigh the limited or potential sales market for those individual pesticides.

Approximately 50 percent of all nursery crops produced in this nation are involved in interstate shipments which, by law, must be essentially free of injurious pests. Many nursery crop shipments involve entire plants with soil intact. Obviously, soil increases the likelihood of harboring pests and necessitates safe and effective pesticides to prevent the spread of insects or plant diseases. Such treatments are required by a host of federal and state inspection, certification and quarantine laws. In turn, this makes the nursery industry perhaps even more vulnerable than other agricultural segments to the problems posed by the current minor use pesticide registration and re-registration system.

The nursery industry is continually seeking new plant pest management strategies and is turning increasingly to integrated pest management (IPM) systems where available and proven effective. In fact, AAN and its grower division (the Wholesale Nursery Growers of America) have recently published an extensive IPM training manual for nursery growers. Nonetheless, for the foreseeable future, nursery farms need access to minor use pesticides so plants, trees and shrubs can be shipped in compliance with state and federal pest quarantine regulations and phytosanitary certifications.

AAN has been, and remains, a steadfast supporter of the IR-4 program which helps to register pesticides for the nursery industry and other minor use industries. However, for several years, Congress has failed to fund IR-4 at the level necessary to fully conduct its important work. As we approach the 1997 re-registration deadline established by Congress, AAN fears the nursery industry will witness an accelerated loss of minor use pesticides critical to the production and shipment of nursery crops.

Earlier this year, AAN joined other agricultural organizations to form the Minor Crop Farmer Alliance to develop federal legislation to ameliorate the minor use problem. The bills (H.R.4764 and S.2980) were introduced in the 102nd Congress and attracted 93 cosponsors in the House of Representatives, and 16 in the Senate.

While assuring no unreasonable adverse effects on human health or the environment, the purpose of this important legislation is twofold. First, it provides incentives to chemical manufacturers to proceed with minor use re-registrations. Second, it injects some needed flexibility into EPA's registration system. This pesticide issue remains a high nursery industry priority for the 103rd Congress.

CLEAN WATER ACT REAUTHORIZATION

We expect the Clean Water Act (CWA) will be reauthorized by the 103rd Congress. Such a reauthorization will have a direct and broad impact on nursery operations. AAN believes strongly that a CWA reauthorization must incorporate flexibility by offering a menu of best management practice options. Only in this way can the CWA successfully reflect the national diversity in the nursery industry and all of agriculture in geography, soils, climate, agricultural production techniques, and, of course, crops.

Many innovative environmental operating practices, such as water recycling, water-efficient irrigation and nutrient management, have been implemented by nursery growers. In fact, AAN, the Society of American Florists, the Professional Plant Growers Association, and Roses, Inc., earlier this year jointly developed and published a water quality action manual to assist greenhouse and nursery operators in implementing safe and effective ways to conserve and protect water. Any CWA reauthorization must embrace incentives, as well as educational and technical assistance (such as AAN's water quality action manual) to further implement nonpoint source pollution prevention measures within each agricultural sector, including the nursery industry.

Unlike many segments of agriculture, wetlands offer both challenges and opportunities to nursery growers and landscape specialists. For example, a farmer may be prevented from developing or using a wetland area. However, most wetlands are believed to function as filters of sediment, nutrients and pesticides. From a runoff viewpoint, therefore, a wetland may be a nursery farmer's best friend.

Enterprising nursery growers are beginning to find a niche in wetlands plant production. Some landscape firms are carving out a specialty in wetlands mitigation -- the creation or rehabilitation of wetlands -- to replace those lost during construction projects. The Clean Water Act reauthorization will be a high nursery industry priority in the 103rd Congress.

NURSERY INDUSTRY IS ENVIRONMENTAL HORTICULTURE

With attention riveted on the environment, legislators, regulators and other key decision-makers are beginning to fully appreciate the significant multiple environmental benefits of nursery crops. Trees, plants and shrubs are not just aesthetically pleasing. Study after scientific study demonstrate that nursery crops clean the air, help to conserve water, abate soil erosion and provide wildlife habitat. The

nursery industry is perfectly positioned to be agriculture's environmental "knight in shining armor."

Tree planting initiatives, as well as urban and community forestry programs are, and will continue to be, a major focus for AAN and the nursery industry at the national level. In a newly launched federal project, AAN serves as an advisor to the Cool Communities program. It is a partnership among the U.S. Department of Energy, EPA and American Forests to further document the energy conservation benefits of trees in community settings. Building upon the beneficial environmental role of the nursery industry, AAN will be urging USDA to earmark or redirect appropriate funding for urban forestry research priorities and needs.

The Clinton Administration's expected emphasis on urban infrastructure will undoubtedly embrace and promote the planting of trees and shrubs as an integral facet of this major economic stimulus. Trees and plants are genuinely the only part of our investment in urban infrastructure that actually appreciate in value over time. Roads, sidewalks, and bridges begin to depreciate the moment they are constructed.

NURSERY INDUSTRY IS URBAN AGRICULTURE

With the traditional power bases shifting away from the rolling farms of rural America towards our urban and suburban communities, the nursery industry's visible prominence will accelerate -- for two primary reasons. First, although many nursery farms were once situated in rural settings, suburban sprawl has now encroached upon and surrounded many production nurseries. Second, our urban populations see that nursery crops grown on nursery farms are used in their entirety in residential, urban and community settings, so they can have a better understanding and appreciation of nursery farming. As such, the nursery industry perfectly fits the profile of urban agriculture.

There are nursery growers, landscape specialists and garden center retailers in each of the 435 Congressional districts in this nation. AAN suggests it is not only prudent, but is also advantageous for Congress, USDA and all of its agencies, to lend increasing attention to the nursery industry's strong economic contributions to American agriculture, its overwhelmingly positive environmental roles, and its growing political clout. When you gaze into the crystal ball of the future of American agriculture, the nursery industry will be playing an increasingly dominant and positive role.

Outlook '93

For Release: Wednesday, December 2, 1992

OUTLOOK FOR COTTON

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The title of this session, "The Cotton Outlook in a Changing World," is appropriate particularly as 1992 draws to a close. The world is changing perhaps faster than at any other time in history. And these changes have occurred not only in the United States, but in many countries around the world.

Some of the major changes creating more uncertainty at this time include the breakup of the Soviet Union, the proposed market reforms in China, the outcomes of the General Agreement on Tariffs and Trade (GATT) and the North American Free Trade Agreement (NAFTA), and the new Administration and its agenda that will be in place in 1993. Indeed, the cotton industry will be affected by the winds of change.

Outlook for 1992/93**U.S. Production and Consumption**

Glancing back at 1991/92, U.S. cotton production reached its highest level since 1937/38. Production exceeded total use and the extremely tight stock situation was partially alleviated as the current season began.

In 1992/93, a smaller planted area and a much larger than normal abandonment have reduced crop prospects from last season. Although abandonment is projected at 2.2 million acres, improvement in yields to their second highest on record have lessened the effect of the "lost" acreage. Currently, 1992/93 U.S. cotton production is forecast at 16.2 million bales. Upland production is estimated at 15.7 million bales and extra-long staple at 496,000 bales.

Domestic mill use is expected to increase for the third consecutive year. Last season, U.S. mills used more cotton than at any time since the early 1950's. Despite the sluggish U.S. economy, the rise in consumption last season was related to stronger sales of

apparel and home furnishings and a rise in textile exports. These increases have continued into 1992/93 as consumers' preference for natural fibers is expected to push cotton use higher. This season, U.S. cotton consumption is forecast at 9.7 million bales.

Consumption on a seasonally adjusted annual rate for August, September, and October averaged 9.6 million bales. Although below the estimate for the marketing year, mill use is anticipated to improve as the season progresses. While consumption is expected to rise, cotton's share of fibers used on the cotton system is likely to remain near current levels. During the first 3 months of 1992/93, cotton's share averaged about 75 percent. If the season's share remains near this level, it would be the largest since 1967/68. During the 12 months of 1991, per capita cotton consumption reached 24.6 pounds, the highest since 1966. Per capita consumption is expected to remain near this level in 1992.

Recent price weakness may also support both cotton usage and share. Mill-delivered cotton prices have declined since July, and in October were 64 cents per pound on a raw-fiber-equivalent basis. Prices of polyester staple, however, have remained stable during the past 7 months, averaging 77 cents. This has put cotton in its most competitive position since September 1988.

In addition, domestic mill use is expected to increase despite rising imports of foreign textiles. U.S. cotton textile imports are projected to reach a record 3.2 billion pounds. Although textile exports have risen during the past several years, the cotton textile trade deficit may approach 5-million bale equivalents and represent about one-third of total domestic consumption.

Foreign Production and Consumption

Since 1988/89, foreign cotton production has exceeded 67.6 million bales annually. In 1991/92, foreign outturn reached a record 78.2 million bales. Because of a weak world textile economy last year, foreign carryover supplies increased more than 36 percent, totaling 36.3 million bales. World cotton prices continued lower last season as the prospects for large production eventually became a reality. Last spring, the Cotlook A-Index averaged about 56 cents per pound, nearly 30 cents below a year earlier. As expected this season, less foreign acreage was planted to cotton and more to alternative crops.

Foreign harvested area is currently estimated at 71.3 million acres, down only 2.4 percent. However, several countries such as China, Pakistan, Australia, and the former Soviet Union have experienced adverse weather or other production-related problems this season. As a result, overall foreign yields are expected to average only 478 pounds per acre, down 7 percent from a year earlier and the first decline since the 1988/89 season.

Foreign production in 1992/93 is projected at 71.1 million bales, 9 percent below last

season and also down 9 percent from earlier estimates this season. Although India is projected to produce a near-record 10 million bales this season, overall crop conditions in many other foreign countries have continued to deteriorate, reducing production potential. Production is estimated at 21 million bales in China, 5 million below October estimates. The former Soviet Union's production is expected to decline 12 percent to 9.9 million bales, while Pakistan's production is projected down 6 percent to 9.4 million bales. Cotton outturn in Australia is expected to fall 24 percent from a year earlier to 1.75 million bales.

World consumption in 1992/93 is expected to reach a near-record 86.7 million bales, a 1.65-million-bale increase, following last season's decline. Foreign consumption is forecast at 77 million bales this season, about 1 million below the record, but still the third largest offtake. During the past five seasons, foreign consumption has varied by only 2.5 million bales.

In the past few years, foreign cotton consumption gains have been concentrated in major producing-exporting countries. For example, China is expected to increase consumption to a record 21 million bales this season. Likewise, India and Pakistan continue to expand their textile industries, with consumption projected at 9.1 and 6.8 million bales, respectively. If achieved, these consumption rates would represent record levels for both countries.

Consumption in net exporting countries has increased each season since 1981/82 and is forecast to reach 65.4 million bales this year. Net exporters' cotton usage this season is 42 percent above 1980/81 consumption levels and accounts for nearly 85 percent of foreign consumption. In 1980/81, net exporters' share of foreign use was 78 percent. Conversely, consumption in importing countries peaked in 1988/89 and has declined each year since then. In 1992/93, consumption by cotton importing countries is forecast at 21.3 million bales, 3.7 million below 1988/89 and only 12 percent above 1980/81 usage rates.

A further look at some of the major textile producing regions which primarily rely on raw cotton imports indicates where consumption losses have occurred. For example, economic and social reforms underway in Eastern Europe have resulted in significant consumption declines. In 1992/93, Eastern European mills are expected to consume only about 50 percent of the cotton utilized in 1980/81. Similarly, the European Community (EC) has not sustained consumption rates achieved in the mid-1980's. Cotton consumption in EC countries this season is projected near the 1980/81 level.

Consumption rates in Asia have also been flat since the mid-1980's. Major textile producing countries such as Japan, Hong Kong, Taiwan, and Korea have reduced textile output and likely substituted imported yarn and fabric for raw cotton. Only in Southeast Asia have cotton consumption rates continued to grow as Indonesia and Thailand have increased their textile production capacity. In 1992/93, Southeast Asian mills are utilizing

nearly 2.5 times the raw cotton consumed in the early 1980's. These trends have been a major factor in limiting world trade in raw cotton.

World Trade

World cotton exports are forecast at 22.7 million bales in 1992/93, 1 percent above last season, but more than 3 million bales below the 1986/87 record. In addition, major foreign exporters' shipments are expected to rise from 12.9 to 13.6 million bales this season.

Among major exporting nations, the former Soviet Union is expected to gain an increased share of global cotton trade this season. Lower domestic consumption will likely result in larger exports to obtain needed foreign currency. Exports in the former Soviet Union are expected to reach 4 million bales, 500,000 above last season. Pakistani export projections are up 350,000 bales and may total 2.3 million bales. Also, China will likely return as a net exporter for the first time since 1988/89. In 1992/93, China is forecast to ship over 1 million bales to foreign mills.

U.S. exports are forecast at their lowest since the disastrous 1985/86 season when less than 2 million bales were exported. U.S. cotton shipments are forecast at 6 million bales, a 26-percent share of global trade and 4 percentage points below 1991/92. However, U.S. trade shares to some major markets, such as Japan and Indonesia, may rise this season.

With an abundant foreign cotton supply and aggressive pricing by the former Soviet Union and Pakistan, world cotton prices have fallen to their lowest level in several years. The Central Asian quote has been the lowest "A"-type cotton quote since late-February, and is currently 4 cents below the Cotlook A Index, the average of the cheapest 5 of 13 growths quoted on the Northern European market. The Cotlook A Index averaged about 53 cents per pound in November, the lowest since November 1986. The adjusted world price (AWP), the U.S. equivalent of world prices, has been below the loan rate since November 1991. Since the 1992/93 season began, the AWP has fallen from 47.5 cents per pound to near 38 cents, before increasing to 39.5 cents.

Outlook for 1993/94

World Consumption

The long-term consumption growth rate (1950/51-91/92) is about 2 percent per year. This compares with the 1981/82-91/92 rate of about 3.4 percent. Growth during 1992/93 is close to the long-term trend. Which growth rate will prevail in 1993/94? With plentiful supplies and currently competitive cotton prices, growth in use next season may more closely approximate the rate of the past decade, which would point to world

consumption between 88 and 91 million bales, with 78 to 81 million indicated for foreign mills.

Domestic consumption in the United States should remain strong again next season as well. Competitive cotton prices, relative to manmade fibers, and the continuation of consumers' preference for natural fibers contribute to this strength. Domestic consumption in 1993/94 could range between 9.5 and 10.0 million bales. Several factors that could alter this range include: the rate of growth in the general economy; consumer confidence; the level of apparel sales, especially denim and sportswear; and the continuing impact of textile imports.

World Trade

World imports have generally increased about 1.6 percent per year over the last 40 years. During the past two seasons, imports have been below trend. However, looking at the ratio of imports-to-use for the same period, the ratio has declined about 0.3 percent per year. This explains the limited upward movement in world trade, as consumption is rising in major producing, rather than in importing, countries.

World trade next season is expected to remain near this year's level, around 23 million bales. Although major foreign producers are expected to increase consumption, foreign export competition will likely remain intense as stocks are worked down in China, Pakistan, and the former Soviet Union. The abundant foreign supplies are expected to continue to weigh on U.S. exports next season, but with the competitiveness provisions in place, U.S. export shipments are expected to range between 5.5 and 7.5 million bales.

Foreign Production

Despite low cotton prices and large carryover supplies, foreign production may increase from this season's reduced level of 71.1 million bales. A larger outturn could occur if yields rebound to near trend in countries such as China, Australia, and the former Soviet Union.

In the former Soviet Union, cotton area has declined for five consecutive seasons. Although small area reductions may continue, it is projected that under "normal" growing conditions, cotton production should stabilize between 10 and 11 million bales.

Pakistan reduced cotton plantings in 1992/93 for the second year after 4 consecutive years of increase. Area expansion in Pakistan has diminished as officials have promoted other crops, notably sugarcane and rice, though it is unlikely that production will decline significantly from this season's 9.4 million bales. Adoption of higher-yielding varieties and the need to meet rising domestic consumption should keep Pakistan's production between 9 and 11 million bales. Similarly, India's production may be near this season's

10-million-bale crop as domestic cotton requirements continue to rise.

In the African Franc Zone, cotton is primarily produced for export earnings. Likewise, major producers located in the Southern Hemisphere also export a significant share of their production. Lower production as well as lower exports could occur if weak cotton prices persist. In total, foreign cotton production in 1993/94 could range between 70 and 75 million bales.

U.S. Production

The early-season outlook for U.S. upland cotton production points to planted acreage near this season's estimate, but a larger crop. This projection is based, in part, on the 1993/94 upland cotton acreage reduction program (ARP). A preliminary 7.5-percent ARP was announced on November 2. The 1990 Farm Act requires that the upland cotton ARP be set at a level which will result in a ratio of projected stocks to use of 30 percent.

Based on USDA's October supply and use estimates, the announced 7.5-percent ARP was consistent with this ratio. The final ARP can differ from the preliminary ARP announcement if supply and demand conditions warrant an adjustment. Since the final ARP must be announced by January 1, it will be based on USDA's December supply and use estimates.

Other provisions of the 1993/94 upland program include a target price of 72.9 cents per pound, the statutory minimum, and a loan rate of 52.35 cents for base quality cotton. The marketing loan program and the three-step competitiveness provisions implemented for the 1991/92 and 1992/93 marketing years will also be in effect next season.

Participation in the 1993/94 upland cotton program is expected to exceed this season's 87-percent base enrollment. If weather is more cooperative than this season's and abandonment is closer to the 5-year average of 6 percent (the abandonment rate in 1992/93 was 17 percent, the highest since 1933/34), and if trend yields are realized, 1993/94 upland production could approach 17 million bales. With historical variations in abandonment and yield, production will likely range between 16.0 and 17.5 million bales.

Upland stocks are expected to increase nearly 1 million bales and reach the 30 percent stocks-to-use target. Although U.S. stocks are far from excessive, large foreign supplies have pressured prices. Barring any crop disasters, it may take more than a year to see a significant improvement in the world stock situation.

Extra-long staple cotton acreage and production will likely decline in 1993/94. Details of next season's ELS program were announced by USDA on December 1. An ARP of 20 percent was established, the largest ELS acreage reduction program to date. Although

participation has been relatively low compared to upland, a large carryover and weak prices should encourage relatively high participation in the 1993/94 ELS acreage reduction program.

In 1993/94, ELS planted area could shrink to less than 250,000 acres. Assuming trend yields and normal abandonment, ELS cotton production could range from 400,000 to 450,000 bales.

Foreign mill demand will continue to be the dominant market for ELS cotton. U.S. exports are projected between 300,000 and 350,000 bales and domestic mill use near 75,000 bales, both slightly above the current season. With limited growth potential in either exports or domestic consumption, ELS stocks may increase even with the 20-percent acreage reduction program in effect.

Today, the cotton industry faces many challenges, but the industry is also provided with new opportunities. The aim of the current farm legislation, the Food, Agriculture, Conservation, and Trade Act of 1990, was to continue the market-oriented programs of the 1985 Act. This included keeping U.S. cotton competitive in world markets, which has already been tested with success.

While excessive world stocks may require a couple of years before returning to normal, production and consumption are expected to continue trending upward. If the United States is to remain a major factor in world production and trade, the U.S. must continue to ensure that adequate supplies of cotton are on hand to meet both domestic and export demand.

Table 1--World cotton supply and distribution, 1988/89-1993/94

Countries	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
Million 480-lb. bales						
Beginning stocks:						
World	33.0	32.1	26.5	28.9	40.0	40.2
U.S.	5.8	7.1	3.0	2.3	3.7	4.3
Foreign	27.2	25.0	23.5	26.6	36.3	35.9
Former USSR	1.4	1.9	2.0	3.4	3.7	2.7
PRC	7.6	6.0	4.4	6.4	14.0	13.3
Pakistan	1.7	0.7	1.2	1.6	3.1	3.3
Other Exporters	9.9	9.5	9.2	8.8	9.8	10.3
Importers	6.6	6.9	6.7	6.4	5.7	6.3
Production:						
World	84.4	79.8	86.9	95.8	87.3	
U.S.	15.4	12.2	15.5	17.6	16.2	
Foreign	69.0	67.6	71.4	78.2	71.1	
Former USSR	12.7	12.2	11.9	10.0	9.9	
PRC	19.1	17.4	20.7	26.1	21.0	
Pakistan	6.6	6.7	7.5	10.0	9.4	
Other Exporters	27.5	28.4	28.6	29.3	27.8	
Importers	3.1	2.9	2.7	2.8	3.0	
Imports:						
World/Foreign	26.7	25.4	23.9	23.1	22.4	
Former USSR	0.4	0.4	0.2	0.1	0.1	
PRC	1.5	1.9	2.2	1.7	0.4	
Other Exporters	1.1	1.4	1.3	2.0	3.1	
Importers	23.7	21.7	20.2	19.3	19.8	
Consumption:						
World	85.3	86.7	85.4	85.0	86.7	
U.S.	7.8	8.8	8.7	9.6	9.7	
Foreign	77.5	77.9	76.7	75.4	77.0	
Former USSR	8.9	9.2	8.7	7.5	7.0	
PRC	20.5	20.0	20.0	19.5	21.0	
Pakistan	3.7	4.8	5.7	6.5	6.8	
Other Exporters	19.4	20.0	19.9	20.0	20.9	
Importers	25.0	23.9	22.4	21.9	21.3	
Exports:						
World	25.8	23.9	22.9	22.5	22.7	
U.S.	6.1	7.7	7.8	6.7	6.0	
Foreign	19.7	16.2	15.1	15.8	16.7	
Former USSR	3.7	3.3	2.0	3.5	4.0	
PRC	1.6	0.9	0.9	0.6	1.1	
Pakistan	3.8	1.4	1.4	2.0	2.3	
Other Exporters	9.2	9.5	9.8	8.7	8.2	
Importers	1.4	1.1	1.0	1.0	1.1	

Source: USDA, Foreign Agricultural Service.

Outlook '93

For Release: Wednesday, December 2, 1992

WHAT LIES AHEAD FOR THE FORMER SOVIET UNION?

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Introduction

The fluid political and economic situation in the former Soviet Union (FSU) makes it difficult to predict how the ongoing changes will affect the cotton industry. However, major changes are slowly evolving that impact the production, processing and marketing sectors of the cotton industry.

On the supply side, it appears that production could stabilize at about 10 to 11 million bales. Prior to the breakup, cotton production averaged about 12 million bales.

On the demand side, the major Central Asian producers exported virtually all of their cotton to Russia and other cotton-consuming republics. Today, the Central Asian countries are shipping less cotton to the cotton-consuming countries of the FSU and are exporting more cotton to Europe and Asia. This trend is expected to continue because of the need to earn foreign exchange.

Turning to the textile sector, in the long run once the Central Asian cotton producers develop viable textile industries, most of their cotton production probably will be consumed internally within Central Asia. At that point, Russia and other consuming countries of the former Soviet Union that still rely on Central Asian cotton producers may have to look elsewhere to meet a growing portion of their raw cotton requirements. In the short run, cotton shortages in the cotton-consuming countries should be eliminated as soon as the political and economic differences among the countries of the former Soviet Union are resolved.

Production

Total production for 1992/93 is forecast at 9.4 million bales, 16 percent below last season's level largely because of planting delays resulting from cool temperatures during the spring and summer. Even with the decline, a crop of this magnitude would make Central Asia the fourth largest producer in the world behind China, the United States and India.

Because cotton is grown in large desert basins, both upland and extra-long staple cotton are grown under irrigation. Canal systems are used to transport water from rivers to cotton fields. Cotton is grown in the five Central Asian countries of Uzbekistan, Turkmenistan, Tajikistan, Kazakhstan and Kyrgyzstan and in the Transcaucasian country of Azerbaijan. When viewed from an individual country perspective, Uzbekistan accounts for the largest portion

(approximately 60 percent) of total output. Turkmenistan and Tajikistan, the second and third largest producers, produce around 17 and 10 percent, respectively, of the former Soviet Union's cotton production.

Production declines in the three largest producing countries since the 1989/90 season are primarily due to smaller plantings. In Uzbekistan, planted area has decreased as land was shifted to fruits and vegetables and a smaller amount to wheat. A significant portion of last season's area decline was due to the Government's decision to give farmers private property for the development of private farms, including cotton. To some extent, the decrease in cotton plantings in Turkmenistan and Tajikistan also is the result of more cotton area being devoted to food production. Since 1988/89, in Uzbekistan total cotton area has declined on average about 18 percent. The decline in both Turkmenistan and Tajikistan each at 6 percent has been less dramatic.

In the future, further area decreases are likely, particularly if Central Asian cotton-producing countries attempt to feed their rapidly expanding populations. For example, the birth rate in Uzbekistan, a country of 22,000,000 people, is 17.4 per 1,000 people, while in Russia it is 7.0 per 1,000 people. If Central Asian authorities decide to devote more land to food production, they have said that they will make every attempt to avoid a decline in cotton production through higher yields.

Similar to upland cotton, extra-long staple (ELS) cotton is concentrated in the Central Asian countries of Uzbekistan, Turkmenistan and Tajikistan. However, recently introduced market-oriented practices in the cotton spinning industry largely favor the consumption of upland cotton. Also, cotton spinners are attempting to lower their costs by reducing their purchases of more expensive ELS cotton and concentrating on lower priced short-to-medium staple cotton. This practice is likely to continue in the short run.

What does all of this mean with respect to future production from this area of the world? In the short run, rumors of large acreage decreases appear unlikely since cotton exports remain the single largest earner of foreign exchange. Moreover, since the three largest producing countries are not self-sufficient in grain, meat, and dairy products, cotton is being bartered for food with other countries such as Byelarus, Ukraine, Moldova, the Baltic States, and other neighboring countries.

Environmental concerns may affect the outlook for the medium to long term. The Aral Sea and its diminishing water level presents a problem which has no easy solution. Cotton production in both Uzbekistan and Turkmenistan is largely dependent upon irrigation water from the two rivers that feed the Aral Sea: the Syrdar'ya and the Amudar'ya rivers. The Zeravshan River lies between the Amudar'ya and the Syrdar'ya rivers and provides irrigation from Karakul to Samarkand. Unless drip irrigation facilities are brought on line (which appears unlikely in the near term because of costs), the current level of water usage should continue. As long as prices favor cotton production, drastic cuts in cotton acreage appear unlikely. However, diversion of cotton land to food crops could occur due to continued pressures from a rapidly growing population. Should this happen, governments will make every attempt to maintain or increase cotton yields to help offset cotton area decreases.

Because of the importance of cotton to the economies of the Central Asian countries, it does not appear that total cotton production will be allowed to fall drastically. Thus, cotton production could stabilize at about 10-11 million bales in the short run, below the 12 million bale average for the last five seasons. Even so, Central Asia is expected to retain its role as a major cotton producer.

Consumption

While the outlook for production has not been dramatically affected by the dissolution of the Soviet Union, the outlook for consumption does show the effects of the breakup. Prior to the breakup of the Soviet Union, the bulk of cotton production was channeled to the large textile industry outside Central Asia to satisfy internal consumption needs within the former Soviet Union. Today, however, economic restructuring in the FSU is hampering total domestic mill use, particularly with regard to the cotton-consuming countries. Thus, domestic consumption for the entire FSU during the 1992/93 marketing season is currently forecast at 6.5 million bales, 13 percent below last season's estimate and nearly 25 percent below the level consumed in MY 1990/91.

The decrease in the consumption estimate for the FSU is largely due to expectations of reduced usage in Russia, the largest consuming country in the FSU. With total Russian imports for MY 1992/93 forecast at 4.1 million bales, this country is the largest cotton importer in the world. Upon examination of country-level cotton supply and demand data for the FSU over the past eight marketing seasons, Russia's cotton imports have been as large as 6.2 million bales with an annual average of 5.3 million during this period of time.

Currently, Russia cannot secure adequate supplies of raw cotton from Central Asia. Reportedly, the Russian textile industry's inability to purchase sufficient supplies of raw cotton threatens the jobs of approximately 400,000 workers and caused temporary plant shutdowns during July and August. Moreover, the number of shifts at mills has been reduced from 3 to 2. During my recent visit to Russia, I was told the largest mill in the Moscow region only had a 5 to 6 day supply of cotton on hand.

Russia's inability to secure adequate supplies of raw cotton is further complicated by unresolved political and economic relationships with other countries of the former Soviet Union. Moreover, Russian textile firms are unable to turn to the international marketplace to purchase cotton because they have no money. But even if these firms acquired adequate supplies of raw cotton, consumers would be hard put to purchase textile goods since wages have not kept pace with the recent rise in prices for consumer goods.

This situation could present a unique opportunity for U.S. raw cotton exports to penetrate a previously closed market. Most likely, the first step would initially be done through the export credit guarantee programs. Potential Russian buyers would have to be educated about U.S. credit programs. Russian textile firms have expressed a desire to obtain U.S. cotton and are familiar with the quality characteristics of U.S. cotton having purchased small quantities in the past. However, intensified marketing efforts would be

necessary if appreciable amounts of U.S. cotton exports are to move into this market. Finally, cultivating a market such as this one requires a certain amount of risk-taking because of uncertain political and economic conditions.

Trade

Driven by the need to earn foreign exchange, the major cotton producers in Central Asia will continue to be major exporters of raw cotton. In MY 1991/92, total cotton exports from Central Asia were an estimated 3.5 million bales, making that region the second largest exporter in the world. This has occurred in large part because of increased quantities of exports for hard currency moving onto the world market. Because of the financial situation in the countries that comprise Central Asia, this trend will probably continue. Consequently, MY 1992/93 cotton exports from Central Asia are forecast at 4.0 million bales. If exports of this magnitude materialize, once again Central Asia will occupy the spot as the world's second largest raw cotton exporter. In the four years preceding the breakup, raw cotton exports from this region averaged 3.1 million bales annually.

Although driven by the need to earn foreign exchange, the major cotton producers in Central Asia continue to export cotton to Russia and the other consuming countries of the FSU despite current economic and political differences. This is a logical avenue for the Central Asian cotton producers to pursue because infrastructurally the countries which comprised the former Soviet Union are linked together by an extensive railroad system. However, the Central Asian cotton producers own the cotton, while Russia owns the entire railroad system. This situation does not mean that cotton exports will be precluded from moving onto the international marketplace. We have already witnessed large amounts of cotton sold primarily to Europe to earn badly needed foreign exchange. In the long run, however, how much cotton is exported to Russia and other countries of the FSU will depend upon economic and political considerations, price, items to be bartered, railroad charges, and debt reapportionment among the countries of the former Soviet Union.

Textiles

The Central Asian countries and Russia would like to restructure their industries to move textile and textile products onto the world market. To accomplish this, both regions of the FSU would have to modernize an industry that is characterized by inefficient use of capital, labor and raw materials. The industry's problems are further exacerbated by an inability to secure a reliable supply of raw materials. Additionally, no waste fibers are recycled which means that a substantial amount of cotton is lost in the spinning process. To correct some of the inefficiencies, the textile sector must diversify its fiber mix (increasing the production of manmade fibers), produce more yarn categories (including finer count yarns), and provide more diversity in fabric production. At a minimum, it could take 10 to 15 years to restructure this industry.

The major advantage the Central Asian countries have over their Russian counterparts is that they control production. On the other hand, the Central Asian countries face a rapidly expanding population that could easily consume a greater portion of its cotton production. However, the textile sector could provide employment for a rapidly growing population.

Since independence, the three largest producing countries in Central Asia appear eager to establish viable textile industries. Although the building of such an industry will take time in Central Asia, there is no question that the countries in this region have chosen this path like so many other developing nations before them. Levi Strauss has established a plant in Uzbekistan which should be fully operationally in a couple of years.

As alluded to in the beginning of this section, the building of a viable textile industry will take time. How long this will take will be very much dependent upon how much foreign investment takes place. But once the industry is in place, raw cotton exports from Central Asia to Russia and the other consuming-countries which comprised the former Soviet Union will decline.

Conclusion

Although there is a great deal of uncertainty as to the future of the cotton industry in the former Soviet Union, certain trends have surfaced. Despite the breakup of the Soviet Union, this region of the world continues to be among the top four producers of cotton in the world. This trend is likely to continue in the future if the current price structure which favors cotton production is maintained. With regard to demand, however, economic restructuring has resulted in some slowdown in the consumption of cotton in the FSU, particularly in Russia. This appears to be a short term phenomenon. Looking at cotton imports, diversification of cotton suppliers appears inevitable since the cotton-producing countries in Central Asia are unwilling to supply all of Russia's import needs. Consequently, the balance of Russia's massive requirements could easily be provided by other exporting countries, including the United States which can offer credit. On the export front, the United States and other major cotton exporters will continue to face stiff competition from Central Asian exports as long as cotton exports provide a favorable economic return. Finally, with regard to the textile sector, a viable and fully restructured industry appears to be at least 10 to 15 years away. In the interim, if an increasing amount of cotton from Central Asia begins to be channeled to this industry, cotton-consuming countries like Russia will soon have to turn to the international market to supply a growing portion of its import needs. Moreover, once this sector becomes fully modernized, domestic cotton consumption could further increase, particularly in Central Asia. The result could be that the Central Asian cotton producers would have less raw cotton available for export.

Soviet Union

Pre-Independence

Production, Consumption, and Exports

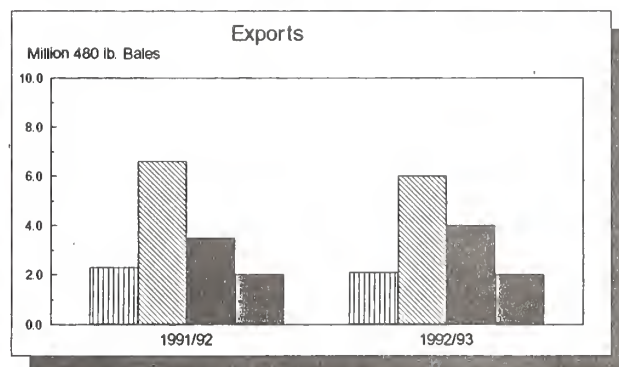
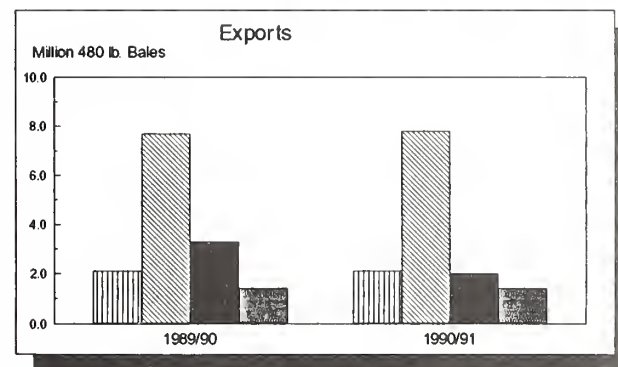
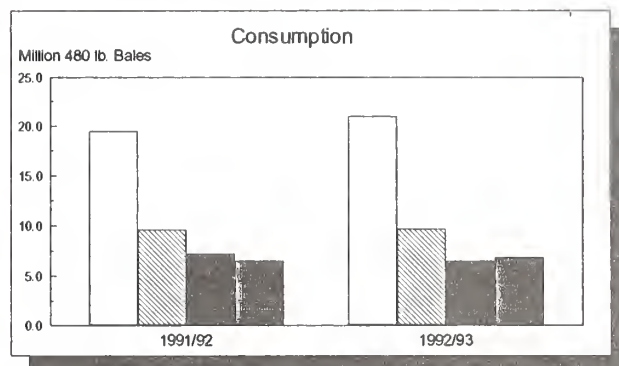
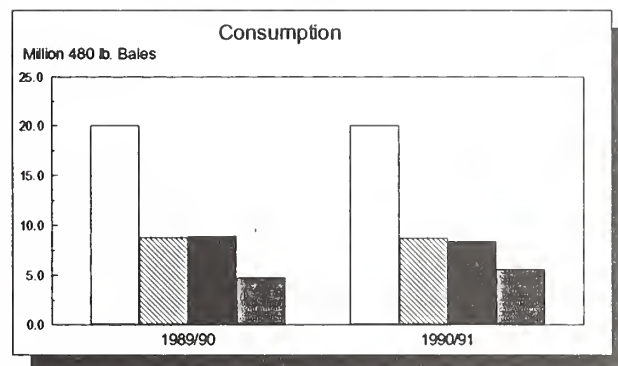
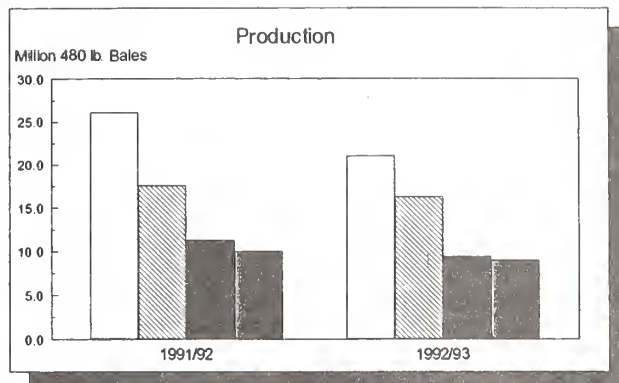
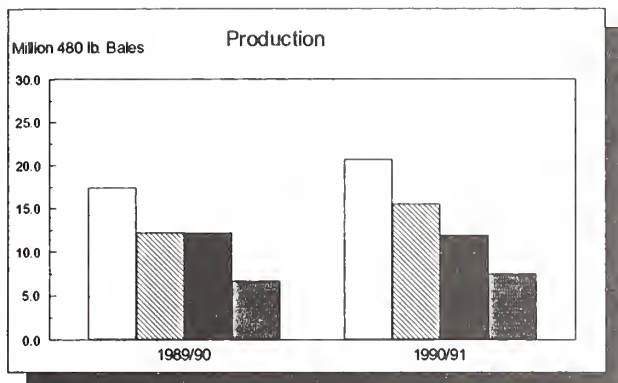
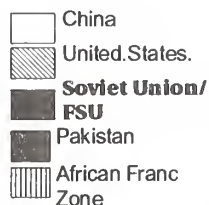
MY 1989/90-1990/91

Former Soviet Union

Post-Independence

Production, Consumption, and Exports

MY 1991/92*-1992/93



*The breakup of the Soviet Union became official December, 1991

The world's four largest producers, consumers, and exporters are depicted in the graphs for years cited above.

Source: USDA/FAS.

The Former Soviet Union's Cotton Production, Consumption, and Trade 1985/86 to 1992/93
(In 1,000 480 Pound Bales)

1992/93

	Area (Hectares)	Yield (KLs/H)	Production	Beginning Stocks	Imports	Consump- tion	Exports	Ending Stocks
Armenia	0	0	0	5	25	25	0	5
Azerbaijan	215	526	519	236	10	160	400	205
Byelarus	0	0	0	12	95	95	0	12
Estonia	0	0	0	21	150	150	0	21
Georgia	0	0	0	12	50	50	0	12
Kazakhstan	110	700	353	118	100	200	300	71
Kyrgyzstan	25	720	83	36	80	130	40	29
Latvia	0	0	0	4	25	25	0	4
Lithuania	0	0	0	10	75	75	0	10
Moldova	0	0	0	13	70	70	0	13
Russia	0	0	0	176	3760	3740	0	196
Tajikistan	150	727	500	230	0	150	500	80
Turkmenistan	600	658	1814	506	0	80	1800	440
Ukraine	0	0	0	90	550	550	0	90
Uzbekistan	1640	814	6131	2245	10	1000	5860	1526
Totals	2740	747	9400	3714	5000	6500	8900	2714
USDA Estimates _1/	2740	747	9400	3714	100	6500	4000	2714

1991/92

	Area (Hectares)	Yield (KLs/H)	Production	Beginning Stocks	Imports	Consump- tion	Exports	Ending Stocks
Armenia	0	0	0	7	38	40	0	5
Azerbaijan	245	722	813	164	9	200	550	236
Byelarus	0	0	0	17	91	96	0	12
Estonia	0	0	0	29	160	168	0	21
Georgia	0	0	0	17	91	96	0	12
Kazakhstan	117	778	418	93	107	200	300	118
Kyrgyzstan	26	731	87	23	88	137	25	36
Latvia	0	0	0	4	23	23	0	4
Lithuania	0	0	0	15	78	83	0	10
Moldova	0	0	0	19	99	105	0	13
Russia	0	0	0	803	3900	4527	0	176
Tajikistan	298	856	1171	234	0	175	1000	230
Turkmenistan	604	710	1971	310	0	70	1705	506
Ukraine	0	0	0	124	686	720	0	90
Uzbekistan	1720	859	6790	1555	10	860	5250	2245
Totals	3010	814	11250	3414	5380	7500	8830	3714
USDA Estimates _1/	3010	814	11250	3414	50	7500	3500	3714

Source: USDA/FAS

_1/ USDA Import and Export data show only the external trade of the former USSR -- not the trade among the republics.

1990/91

	Area (Hectares)	Yield (KLs/H)	Production	Beginning Stocks	Imports	Consump- tion	Exports	Ending Stocks
Armenia	0	0	0	8	46	47	0	7
Azerbaijan	264	682	827	55	9	225	502	164
Byelarus	0	0	0	20	109	112	0	17
Estonia	0	0	0	35	190	196	0	29
Georgia	0	0	0	20	109	112	0	17
Kazakhstan	120	850	468	28	107	225	285	93
Kyrgyzstan	30	833	115	17	88	137	60	23
Latvia	0	0	0	5	27	28	0	4
Lithuania	0	0	0	17	95	97	0	15
Moldova	0	0	0	22	121	124	0	19
Russia	0	0	0	982	5290	5469	0	803
Tajikistan	304	842	1176	82	0	200	824	234
Turkmenistan	623	701	2007	106	0	60	1743	310
Ukraine	0	0	0	148	804	828	0	124
Uzbekistan	1830	870	7316	460	11	840	5392	1555
Totals	3171	818	11909	2005	7006	8700	8806	3414
USDA Estimate _1/	3171	818	11909	2005	200	8700	2000	3414

1989/90

	Area (Hectares)	Yield (KLs/H)	Production	Beginning Stocks	Imports	Consump- tion	Exports	Ending Stocks
Armenia	0	0	0	21	37	50	0	8
Azerbaijan	280	686	882	56	9	247	645	55
Byelarus	0	0	0	19	121	120	0	20
Estonia	0	0	0	34	211	210	0	35
Georgia	0	0	0	19	121	120	0	20
Kazakhstan	119	832	455	28	107	247	315	28
Kyrgyzstan	27	852	106	16	88	137	56	17
Latvia	0	0	0	5	30	30	0	5
Lithuania	0	0	0	17	104	104	0	17
Moldova	0	0	0	21	134	133	0	22
Russia	0	0	0	935	5878	5831	0	982
Tajikistan	309	939	1332	82	0	214	1118	82
Turkmenistan	634	626	1823	114	0	50	1781	106
Ukraine	0	0	0	142	893	887	0	148
Uzbekistan	1969	841	7605	473	12	820	6810	460
Totals	3338	796	12203	1982	7745	9200	10725	2005
USDA Estimates _1/	3338	796	12203	1982	350	9200	3330	2005

Source: USDA/FAS

_1/ USDA Import and Export data show only the external trade of the former USSR -- not the trade among the republics.

1988/89

	Area (Hectares)	Yield (KLs/H)	Production	Beginning Stocks	Imports	Consump- tion	Exports	Ending Stocks
Armenia	0	0	0	16	128	123	0	21
Azerbaijan	298	681	932	47	9	237	695	56
Byelorussia	0	0	0	15	119	115	0	19
Estonia	0	0	0	25	210	201	0	34
Georgia	0	0	0	15	119	115	0	19
Kazakhstan	129	767	455	30	103	237	323	28
Kyrgyzstan	32	750	110	16	84	131	63	16
Latvia	0	919	0	4	30	29	0	5
Lithuania	0	0	0	13	104	100	0	17
Moldova	0	0	0	16	133	128	0	21
Russia	0	0	0	708	5827	5600	0	935
Tajikistan	319	922	1350	58	0	205	1121	82
Turkmenistan	640	641	1883	80	0	41	1808	114
Ukraine	0	0	0	108	885	851	0	142
Uzbekistan	2014	860	7956	297	13	787	7006	473
Totals	3432	805	12686	1448	7764	8900	11016	1982
USDA Estimate _1/	3432	805	12686	1448	404	8900	3656	1982

1987/88

	Area (Hectares)	Yield (KLs/H)	Production	Beginning Stocks	Imports	Consump- tion	Exports	Ending Stocks
Armenia	0	0	0	22	118	124	0	16
Azerbaijan	303	743	1033	66	9	240	821	47
Byelorussia	0	0	0	20	111	116	0	15
Estonia	0	0	0	35	193	203	0	25
Georgia	0	0	0	21	110	116	0	15
Kazakhstan	127	756	441	42	104	240	317	30
Kyrgyzstan	31	645	92	22	85	132	51	16
Latvia	0	0	0	5	28	29	0	4
Lithuania	0	0	0	18	96	101	0	13
Moldova	0	0	0	22	123	129	0	16
Russia	0	0	0	978	5395	5665	0	708
Tajikistan	324	852	1268	78	0	207	1081	58
Turkmenistan	630	603	1745	101	0	41	1725	80
Ukraine	0	0	0	149	820	861	0	108
Uzbekistan	2112	713	6912	452	13	796	6284	297
Totals	3527	709	11491	2031	7205	9000	10279	1448
USDA Estimate _1/	3527	709	11491	2031	383	9000	3457	1448

Source: USDA/FAS

_1/ USDA Import and Export data show only the external trade of the former USSR -- not the trade among the republics.

1986/87

	Area (Hectares)	Yield (KLs/H)	Production	Beginning Stocks	Imports	Consump- tion	Exports	Ending Stocks
Armenia	0	0	0	22	129	129	0	22
Azerbaijan	310	845	1203	91	9	249	988	66
Byelarus	0	0	0	20	121	121	0	20
Estonia	0	0	0	35	211	211	0	35
Georgia	0	0	0	20	122	121	0	21
Kazakhstan	128	844	496	35	108	249	348	42
Kyrgyzstan	30	700	96	17	88	137	42	22
Latvia	0	0	0	5	30	30	0	5
Lithuania	0	0	0	18	105	105	0	18
Moldova	0	0	0	23	133	134	0	22
Russia	0	0	0	988	5876	5886	0	978
Tajikistan	310	945	1346	102	0	215	1155	78
Turkmenistan	653	542	1626	136	0	43	1618	101
Ukraine	0	0	0	150	893	894	0	149
Uzbekistan	2044	794	7450	598	14	826	6784	452
Totals	3475	765	12217	2260	7839	9350	10935	2031
USDA Estimate _1/	3475	765	12217	2260	366	9350	3462	2031

1985/86

	Area (Hectares)	Yield (KLs/H)	Production	Beginning Stocks	Imports	Consump- tion	Exports	Ending Stocks
Armenia	0	0	0	16	136	130	0	22
Azerbaijan	297	869	1185	50	9	250	903	91
Byelarus	0	0	0	15	127	122	0	20
Estonia	0	0	0	25	222	212	0	35
Georgia	0	0	0	15	127	122	0	20
Kazakhstan	130	762	455	30	108	250	308	35
Kyrgyzstan	29	621	83	16	89	138	33	17
Latvia	0	0	0	4	31	30	0	5
Lithuania	0	0	0	13	111	106	0	18
Moldova	0	0	0	16	142	135	0	23
Russia	0	0	0	708	6197	5917	0	988
Tajikistan	313	930	1337	57	0	216	1076	102
Turkmenistan	562	690	1781	75	0	43	1677	136
Ukraine	0	0	0	108	941	899	0	150
Uzbekistan	1985	871	7936	312	14	830	6834	598
Totals	3316	839	12777	1460	8254	9400	10831	2260
USDA Estimate _1/	3316	839	12777	1460	593	9400	3170	2260

Source: USDA/FAS

_1/ USDA Import and Export data show only external trade of the former USSR -- not the trade among the republics.

Outlook '93

For Release: Wednesday, December 2, 1992

U S TRADE PROSPECTS

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Let me begin by extending my thanks to Russell Barlowe and others with the USDA for inviting me here today to speak on what is one of the most controversial topics dominating cotton circles in the US and abroad - US Trade Prospects. The US is and has been the dominant raw cotton exporter in the world for some years and, despite some very real challenges from major competitors, should retain this position through this decade although perhaps not to the same degree. The level of US exports this year and in coming years are and will continue to be, outside of production, one of the principal wild-cards in determining whether US fundamentals are bullish or bearish. Their impact on price behavior is significant as is the role they play in influencing future production levels.

The US cotton industry will face its greatest test this year and into the mid-1990's as it attempts to keep exports at an acceptable pace and also maintain market share of world trade. After enjoying three years of exports that reached near record levels, 1992 can be categorized as a year overshadowed by huge foreign production surpluses and intense competition for trade at rock bottom prices. Adding to the burden of supplies is a shrinking demand base that is struggling under the weight of excessive yarn stocks, reduced consumer purchases, and cheap textile imports that are hurting mill margins in the US and overseas.

There are four distinct areas that will greatly determine the level of US exports, not only this year, but in 1993 and 1994. First are the various factors that the US has control over to help boost its exports, i.e. various government programs as they affect price, the integrity of US contracts, a logistical advantage to western hemisphere importers, and a wide variety of cotton types and styles.

Another area affecting US exports are the huge supplies in the hands of key exporting countries and their willingness to offer cotton at extremely competitive prices. Some of these major exporters include FSU, Pakistan, India, China, Turkey, Franco Africa, Egypt, and Australia.

In addition, less raw cotton is in demand from importing countries, in part, because of the current global economic slowdown. However, the effects of adverse economic conditions and even radical price changes of cotton and polyester on consumption are not as great as one might assume at first glance since usage can be categorized as being more inelastic than elastic. A smaller raw cotton trade is also attributed to a growing trend of increased commerce of finished and semi-finished goods that is competing with and replacing raw cotton exports. Simultaneously, the dependence on cheaper imported goods such as yarn has become an albatross for some countries who can not compete domestically with such imports.

Lastly, a series of treaties, such as GATT, NAFTA, and others being discussed or already implemented will impact the textile industry depending on their final disposition. The assumption is, with regional or world agreements, consumption and, trade to a lesser degree, will both benefit while a new round of protectionism could only prove disadvantageous to everyone concerned.

Each and every one of these factors plays an important role in US exports. Now let's take a closer look at them.

US

As of Oct 29, US cotton commitments totaled 4.66 million bales of which 3.86 were undelivered sales. Actual exports were 792,000 bales. Total upland commitments represent 83% of the current USDA estimate of 6 million bales which compares favorably with last year's of 75% and the 5-year average of 68%. Unfortunately, when compared with the average level of exports from the six previous years, MY1992/1993 exports are projected to decline by almost 1 million bales, or 13%. [Exhibit 1]

In addition to viewing the absolute figures for exports, we should also focus on market share of world trade since consumption fluctuates and this provides another measure of US competitiveness. Using estimates from the November 10 USDA supply and demand reports, US market share of current world exports equates to 26.5% in MY1992/1993, down from last year's of 29.5, and the 5 and 10-year averages of 30 and 28% respectively. [Exhibit 2]

What is remarkable in this decline in absolute and market share percentages is not the size of its drop but the fact that it is not any larger in light of the PRC's re-emergence on the export scene along with a renewed aggressiveness by other key exporting countries to deplete their large surpluses through higher exports.

The US cotton industry learned in the early 1980's they could

not and should not be the residual supplier of cotton to the world while carrying large ending stocks. As a result, they worked hard to include several clauses in the 1985 farm bill that would assure the US a more competitive stance in world trade while reducing stocks to a more manageable level.

The success of the 1985 farm bill can be seen by viewing the difference in exports for 5 years of its legislative life when exports reached an average of 6.9 million bales versus the previous five years, when they averaged 5.3 million bales. Without such a program the US might have lost some of its traditional customers in the late 1980's and beyond.

Through further refinements in 1990, the US Marketing Loan Program has achieved a credible level of exports by providing compensatory payments to exporters when US prices are above those of its competitors and insuring sufficient cotton availability via several loan redemption methods.

In MY1991/1992, exporters received an average certificate payment of 193 points per week. Since this program did not start until Aug 1, the beginning of the marketing year, at which time 2.54 million bales or 38% of forward sales were already on the books, only a partial benefit was derived by exporters. [Exhibit 3]

MY1992/1993 marked the first full year of the program's implementation for exporters and many attribute the current level of sales to the success of the step 2 clause. Despite the current level of commitments (83% of projections), several questions have been raised regarding the level of final shipments. The problem arises from the number of sales in the "unknown" category which are unusually high at 883,100 bales. This category has typically been used with a merchant to merchant sale that precluded naming the country of destination. Many traders have expressed the opinion that the reason the "unknown" is so high this year is due to exporters taking advantage of those weeks when certificate values were extremely high by registering sales in anticipation of bookings to countries to be named later. Most noticeable are the 1.96 million bales booked the first week of the program when the certificate value was a record high of 550 points. However, the rules governing the step 2 payments are very clear to avoid any confusion or possible problems. The penalties and liquidated damages assessed on cancelled or delayed sales are more than sufficient to deter any questionable activities. We may not know until next spring the disposition of a majority of these sales, but, bear in mind, current sales even without the additional 883,100 bales, are in line with previous rates. If only a portion of those sales are eventually delivered, exports are likely to meet the USDA goal of 6.0 million bales, and could exceed it.

In addition to the marketing loan program, the 1990 farm bill

included a continuation of the GSM 102 program that is operated under the auspices of the USDA. This program offers credit guarantees to countries purchasing US agricultural commodities, including cotton, who might not otherwise qualify through other traditional means. The program is customer-driven. Countries request US assistance and identify the commodity and quantity required, assuming they have met specific requirements and are deemed credit worthy. From 1983 through 1992 this program has helped the US to export an average of 663,900 bales of cotton or 9.88% of total sales on an annual basis. Monies appropriated for the cotton portion of this program have varied from a low of \$167 million dollars in 1983 to a high of \$386 million dollars in 1985. As for 1992, total dollars spent to date are \$238 million, with 662,000 bales shipped thru Nov 1.

For FY1993, 4.2 of 5.7 billion dollars has been issued of which \$350 million was designated for cotton exports. Using a projected average cash price for US cotton, we can determine that shipments could reach upwards of 800,000 to 1 million bales via this program. Although the final shipment date for delivery falls on Nov 30 of each year, the majority of those shipments will be included in the 1992/1993 marketing year. [Exhibit 4]

Those countries that have qualified this year include South Korea which has been and is by far the largest recipient, and several eastern European countries such as Romania, Hungary and Czechoslovakia. The presence of former members of COMECON suggest not only some recovery in their textile industries but difficulty in finding suitable financing elsewhere. These difficulties may include a lack of traditional forms of credit, a desire to avoid the exclusive use of barter arrangements, or a shortage of hard currency with their former supplier, the FSU. With the eastern European countries' economies projected by several world organizations such as IMF and World Bank to display some recovery over the next 2-3 years, their textile use may also rebound, suggesting additional use of the GSM program.

Since the Marketing loan program and GSM 102 are a part of the 1990 farm bill, their presence will continue into 1995 along with funds allocated for their budgets. Although we can not predict with any precision the exact impact these programs will have on future exports, it appears as though they will be an integral factor in keeping US cotton competitive in the world market.

Third, the longstanding integrity of the US contract and the merchants who sell US cotton are also responsible for keeping US exports at consistently high levels. This factor, because of its abstractness, is difficult to measure. One indication of this quality is the difference in long term commitments made for US cotton as opposed to those made for foreign countries for nearby shipments of ex-US growths. The US has consistently maintained

sales well into its next marketing year, a feat not easily duplicated by many of its competitors. Despite drastic changes in price or availability that occur on occasion, contracts involving US cotton have been and continue to be honored, a claim that many foreign governments can not make. In a year when foreign mill margins are being squeezed ever tighter, paying at or below market prices for raw cotton is almost a necessity. Willingness to buy US cotton at prices above those of most foreign growers is a real testament to US exporters.

In this same vein, the willingness of merchants to seek out new markets to replace those lost through attrition or poor economics has also benefitted US exports. In a year when foreign cotton prices are generally lower, the US geographic location has worked to its detriment because of its higher freight rates to European, Middle Eastern and Far Eastern locations. However, its proximity to countries in the western hemisphere and therefore lower freight rates, offsetting in part the difference in cotton prices has resulted in new sales into nontraditional markets. For instance, exports to China in MY1990/1991 and MY1991/1992 reached 1.2 million and 792,000 bales respectively, yet, due to a large shift in the PRC's supply, little if any US cotton will find its way into this country during MY1992/1993. Because of poor margins, excess capacity, heavy competition from cheap imports, etc, other Asian countries are also buying less cotton, leading to a decline in US sales. Commitments through Nov 5 totaled 47%, almost one-half of a comparable figure from MY1991/1992 of 81% to Asia in this marketing year.

A portion of this loss in business was offset when Mexico's production took a sharp downturn this year creating a massive swing in their cotton trade from a net exporter of 63,000 bales in MY1991/1992 to a net importer of 560,000 bales this year. Because of America's strategic location to Mexico, the US will reap the vast majority of these new sales. A downturn in Central and South American production is also opening doors for additional US cotton exports into this region. Exports into the Western Hemisphere are responding to this increase in business with current commitments comprising 15% of total commitments as opposed to last year's of 4% through the fourteenth marketing week. [Exhibits 5a, b and c]

Surprisingly, sales into Europe are holding, with their share up from year ago figures, 15% against 11%, despite the big increase of FSU cotton sales into this region. Since the W. Hemisphere and European commitments are ahead of last year and the percentage of commitments already reflect those sales in the unknown column, they are unlikely to lose significant ground through the remainder of the marketing year.

Lastly, huge acreage losses that reduced Texas production by as much as 40-45%, cut into exportable supplies of Texas styles

for this marketing year. Typically, Texas styles make up 20-40% of US exports, depending on a wide array of variables. The likelihood of such a devastating repeat in the near future would seem small for this area of the country so a rebound in Texas production is foreseen. In addition, with improved varieties and a more forgiving climate in the Farwest and Memphis Territory, we can also rule out the possibility of such a cataclysmic event affecting these areas. With the MY1993/1994 ARP set-aside at 7.5%, sufficient acreage and therefore production forecast, exports are likely to benefit from increased supplies. Depending on other elements to be discussed in this article, exports at and possibly above current expectations of 6.0 for MY 1992/1993 appear reasonable.

EXCESS FOREIGN SUPPLIES

Without a doubt, one of the largest reasons that US exports will remain under pressure in the near future are the huge available supplies in several exporting countries such as FSU, PRC, India, Pakistan, Turkey and Australia. In MY1991/1992 US exports were 29.5% of world exports while 4 of these 5 countries (China was a net importer and not included) made up 32%. Using latest USDA figures for MY1992/1993, those percentages have moved in favor of foreign suppliers, who now garnish over 40% of world exports as opposed to the US's 26%.

Heavily subsidized government programs in a variety of countries, whether democratic or centrally planned, have increased world production by 16% in the last three years compared to the previous five years. Examining world exports during this same time frame, we find they dropped 4% compared to the previous five years. Several mini-factors contributed to the gross imbalance that currently exists:

- 1- growth of the textile market in late 1980's encouraged expanded cotton production, particularly in countries where such production was subsidized and therefore more profitable than grain or oilseeds production
- 2- fall of communism and transition to market driven economies in various countries created a two-fold problem; an inordinate need for hard currency forcing cotton sales at almost any price such as in the FSU and mill consumption dropping drastically in the FSU and Eastern Europe
- 3- improved farming techniques enhanced yields in lower producing countries such as India and Pakistan
- 4a- increased cheap textile exports into traditional countries that produce the same goods have cut

into demand for raw cotton, thus hurting US market share, i.e. Pakistan yarn exported to Japan

- 4b- a continuing trend of major cotton producers also exporting growing numbers of textile goods, thus coloring and redefining the difference between traditional suppliers of cotton and makers of textile goods
- 5- a significant economic downturn in many countries which reduces consumer demand for textiles and in turn lowers world trade

These elements will be incorporated in our discussion as they pertain to specific countries. Now, a look at some of those key exporting competitors. [Exhibits 6a, b, c and d]

CHINA

The PRC's huge cotton production and overwhelming stock levels have been at the forefront in dominating current world supply and demand. Even though China's stocks were reduced by almost one-third in last month's USDA S/D report, they remain very high at 13.3 million bales. Despite a drop of this magnitude, Chinese net exports were maintained at 690,000 bales, 460,000 in versus 1.150 million out.

Market fears of heavy exports from China have run rampant this year because of their high stocks level and prior history of promoting big exports as happened in the mid 1980's. Fueling those fears are the efforts taken by China's central government in recent months to decentralize and liberalize its economic structure. In turn, these actions have enhanced the imminent likelihood of greater autonomy being granted to the provinces and allowing them access to foreign markets. The Chinese government has already given a small portion of unceded stocks to the provinces, as was the case in the mid-1980's, but how they will be allowed to dispose of the cotton and under what conditions are still unknown.

Notwithstanding these concerns, three differences exist this year that suggest Chinese exports will fall within USDA expectations. First, with official long term consumption goals set at 25 million bales annually, there is the appearance that current stock levels may be acceptable to the government. Next, the disastrous outcome of large exports in mid-1980's reduced stocks to such low levels that huge shortages resulted, leading to large imports in the late 1980's, a situation that the Chinese found very distasteful. Lastly, the state supported price within China is above world prices for cotton and some, if not all, exports would have to be subsidized by the government. Additional subsidies could hurt the Chinese in two ways; hamper their re-entry into GATT and add to their growing budget deficit.

For these reasons, the probability of exports above and beyond those forecast by the USDA this marketing year appear small particularly in light of the level of world exports already committed and the lateness of the marketing year. Unfortunately, that may not be the case with 1993/1994 and 1994/1995, depending on the level of Chinese production and its impact on ending stocks. Several sources have expressed varying opinions as to whether the Chinese government will retain the same level of control over cotton production in 1993 and 1994 and whether that production will be supported to the same degree as was the case in the last two years. A close eye will have to be kept on future production as it influences the level of Chinese net exports and its longer term impact on US competitiveness.

FSU

The next country we will look at is the Former Soviet Union, and more specifically, those southern republics that account for all of the cotton production. As the transformation from communism to a democracy has raced through the FSU, attempts to move toward a market based economy have proven to be extraordinarily difficult. Moving away from a tight knit union forced to depend on each other, this now fragmented group of republics are wielding their own independence by handling their own internal financial affairs. Unfortunately, the break-up also created an inordinate need for hard currency in all of the republics, and Russia, the largest consumer of FSU cotton, could no longer meet those needs for those republics that produce cotton. These republics began to offer a larger portion of their cotton outside the FSU at fire sale prices in an attempt to immediately attract new customers. After a slow start, republics like Uzbekistan, have been moderately successful in their bid to gain market share. In MY1990/1991, practically no cotton was sold to Brazil, Taiwan, or Hong Kong from Central Asia (FSU) while in MY1991/1992, exports advanced to 368,000 bales and also accounted for two-thirds of all French imports.

As a whole, FSU cotton exports to non-FSU countries reached 3.5 million bales in MY 1991/1992 with this year's exports likely to expand by 14% to 4.0 million bales. Simultaneously, exports to other FSU countries, and Russia in particular, may fall further since industrial production as a whole is plunging. One recent official report lowered Russian industrial production by 30% during the month of October. Since 1989, internal trade has fallen 27% while external trade advanced 20%. Russia's financial headaches may be just beginning as they attempt to maneuver through upcoming debt payments to the West. Efforts to restructure these payments are symptomatic of much deeper economic ills and makes one wonder whether they can honor all current cotton contracts with their southern neighbors. Some additional cuts in shipments to Russia could occur into MY1993/1994 even if Russia's textile industry improves. However, the southern republics have no desire to build stocks further and

their infra-structure is hard pressed to support additional exports outside of FSU, hence, some leveling off of reduced exports to non-FSU republics is anticipated by FY1994.

With cotton production unlikely to change greatly in the near term and hard currency/foreign exchange critical to their survival, the Central Asians will continue to promote cotton exports in the 4.0 million range for the foreseeable future.

PAKISTAN/INDIA

The other two countries we will focus on are Pakistan and India. In addition to sharing a border, other similarities exist. Production has increased in these two nations by 25% since 1989 due to improved farming techniques while exports have grown by a nearly identical 23%. In the case of Pakistan, their ending stocks during MY1991/1992 doubled due to a record crop and the inability of exports to absorb this excess. In addition, Pakistan's cotton policy was changed this year to reduce export taxes on lint at current international price levels.

As for India, MY1992/1993 production will grow by almost 10% with their domestic industry likely to consume only half of the increase. India's trade status has shifted since 1990 when they exported almost 1 million bales versus 1991 when they were forced to import 235,000 bales to cover domestic needs. 1992 will see India return to its exporter role with 700,000 bales and possibly as much as 1 million depending on final production estimates due out in December.

These four countries, China, Pakistan, FSU and India comprise 48% of current world supplies and 50% of global ending stocks for MY 1992/1993. They also account for 51% of this year's world-wide usage, yet their exports are only one-third of all exports. Whether or not exports from these main competing countries expands in the near future may be less a function of supply and more one of increased demand.

In summary, foreign supplies and stocks appear more than ample for meeting demand this year and into MY1993/1994. Changes in next year's foreign production and consumption are unlikely to absorb the excess in several key exporting countries. The US will continue to find its market share under attack even if world trade recovers to pre-1992 levels.

RAW COTTON VERSUS TEXTILES TRADE

Excess beginning stocks and production are only a part of the problem with lower US and world exports. Two distinct trends have developed in the last 10 years that portend major changes in how we view cotton exports. The first involves major cotton producers who are consuming more cotton and exporting less.

Even though world cotton production has jumped by 30% in the last 10 years, raw cotton exports have only increased by half that number, 15% with increases in consumption and stocks accounting for the difference. During 1992/1993, world cotton trade will comprise about 25% of world consumption, a drop of 8 to 10 percentage points from the early 1980's.

Increased export growth of textile markets is also proving troublesome for raw cotton exports as their share of consumption has dropped in recent years. Since MY1983/1984, world consumption needs for raw cotton have dropped from 31% to 26%, being replaced by processed cotton textiles such as yarns, fabrics, and apparel. Pakistan, India, China, Turkey and a variety of other countries have jumped into this emerging market for textiles wholeheartedly. Few other areas of the world are feeling the presence of textile imports stronger than in Western Europe. In 1991 China overtook Turkey as the EC No. 1 supplier for textile and clothing, increasing its exports by nearly 23% to 305,000 tonnes. India's textile exports grew nearly 15% last year to 217,000 tonnes giving it the No. 3 spot while Pakistan ran close behind lifting its exports by 9% to 179,000. All this, despite EC bilateral accords that limited annual textile growth rates of 4-6%. [Exhibits 7a, b, and c]

The US has found itself in a similar situation with its domestic industry fighting off textile imports that have tripled since the early 1980's. But here too, we find US apparel producers have moved quickly and been successful in penetrating overseas markets. According to the U S Commerce Dept, US apparel exports to Japan and Europe are increasing. For instance, in 1990, textile exports to Japan were only \$57 million, while in the first six months of 1992, that figure had grown to \$131 million. Approximately 15% of all US goods are currently being exported, with many industry analysts expecting US apparel manufacturers to continue to export 15-20% of their production. [Exhibit 8]

In an August 1992 article by the USDA in their "World Cotton Situation" the FAS summed up this complicated situation quite well, "The trend towards increased textile exports versus the export of raw cotton is expressly evident when comparing the dynamic growth in international cotton textile trade in recent years to raw cotton trade. From MY 1983/84 to 1990/91, raw cotton exports increased a modest 20% while yarn and fabric exports grew by 59%. In MY 1991/92, raw cotton exports were estimated at 22.9 million bales and yarn and fabric exports at 17.6 million bale equivalents. If these trends continue, trade in raw cotton will continue to take a back seat to trade in cotton yarns, fabrics and finished products."

GLOBAL SLOWDOWN

Very few countries have escaped the effects of the global

economic slowdown that has held the world captive for the last 12 to 18 months. Many english-speaking nations such as the US, UK, Canada, and Australia have struggled with low growth and high unemployment since 1990. Even Europe's powerhouse, Germany, is finding it is not immune to economic woes as its high interest rates are cutting off growth in the western sector. An enormous drop of 9-19% in this year's GDP in eastern Europe and in Russia has also kept a stranglehold on world growth.

Some portions of the Far East has fared better in some respects, with China, S Korea, and Malaysia all showing continuing signs of high growth, good exports and large infusions of foreign investment capital. Japan, the catalyst for growth in the 1970's and 1980's for the Pacific Rim, is forecast to experience only moderate growth.

The impact on trade as opposed to consumption with a world-wide recession is not as severe because of the trend away from demand being met through raw cotton trade. Nonetheless, trade may still benefit by as much as 1-2 million bales since any improvement in world conditions would increase textile fibers consumption. In addition, some re-building of stocks in importing countries is expected as prices level out and consumption improves. Their stocks were drawn down by 24% from 1988 to 1991 due to business contractions and high prices.

Specifically, a return to 3% growth world-wide, a level similar to that of the 1980's, would raise income and population, two major determinants of consumption. Latest estimates from the International Monetary Fund suggest growth will be restrained in industrial countries because of a need to reduce debt and large budget deficits, most noticeably in the US. GDP is placed at 3.2% in 1993, up from this year's of 1.8%. On the other hand, developing nations will see growth at 6.2% in 1992 and 1993 because of expected strong economic performance continuing in Asia, Africa, Middle East and Latin America. Figures from the Asian Development Bank are more impressive with Asian growth being boosted into the 7% range this year and next. [Exhibit 9]

The long anticipated improvement in global GDP and its indirect, slight improvement to world trade may work to the US's advantage. As importing countries re-build stocks and trade recovers to the 23-24 million bale area, US exports, depending on market share, could vary from 6.0 to 6.7 million bales over the next two years.

REGIONAL AND WORLD TRADE AGREEMENTS

The last area of influence on raw cotton trade are the various treaties such as NAFTA and GATT. Trade agreements of this size and scope will impact growth, expansion, competition and investment in a favorable manner for those countries involved. As can be seen by a pending change in White House Administration

or the recent agricultural dispute between the EC and US, many obstacles remain before final approval is granted for either or both agreements regardless of their economic boost.

The North American Free Trade Agreement, an accord between the US and two of its largest trading partners, Canada and Mexico, has the best chance for acceptance under the "fast track" authority granted to the President by Congress. Assuming NAFTA is approved, all three countries would benefit through the creation of the world's richest trading block. NAFTA's impact on cotton will be felt by both the domestic mill industry and by exporters. With Mexico and Canada already large importers of US cotton, this agreement will insure their continued use of US cotton. Several trade organizations have voiced their concerns of the longer term effect on US domestic manufacturers and the likelihood of businesses relocating to Mexico because of their cheap labor force. General consensus is that any disruption will most likely be felt by apparel manufacturers as opposed to yarn and cloth makers who may profit from increases in cotton consumption by all three trading partners. Since this pact will not come up for consideration by the US Congress until early 1993 and several weeks/months of debate are foreseen before its approval, NAFTA's influence on the US cotton industry, and in particular, exports may be minimal prior to FY1994.

The other agreement that is under consideration is GATT or General Agreement on Tariff and Trade. This far reaching agreement represents a bold view of how the US and other countries can use trade to prosper in the 21st century through the elimination of quotas and opening of new markets. Some estimates have suggested that world trade could soar by as much as \$200 billion beyond its current \$7 trillion level. Despite the economic windfall that would befall industrial and developing countries alike, many barriers remain before GATT is approved, even with the resolution of longstanding agricultural dispute between the US and EC, such as Japan's ban on rice imports.

The effect of a GATT agreement on cotton is in some respects similar to NAFTA, production and trade would vary little since the countries with the highest subsidies may be given an exemption and growth in trade appears modest despite the potential boost to consumption. The general gain in economic activity will encourage textile consumption, thereby aiding cotton demand but only on a limited scale.

CONCLUSIONS

The current pace of US cotton commitments at 83% of projections is high and comparable to a level not generally achieved until midway through the marketing year. The current level of exports does suggest a drop in US market share from the average of 28 to 30% to 26%, but with heavy competition from a number of key

exporters, the US is fortunate that its share in absolute and percentage terms will not drop further.

The US has at its disposal several means that helps in its promotion of US cotton exports. The marketing loan and GSM programs keeps US prices competitive or at the very least within reach of foreign mill buyers. The integrity of its contract, vast availability of styles and types and willingness to seek out new markets is also keeping US cotton at the forefront.

The downside for the US are the large exportable surpluses available from countries such as China, FSU, India and Pakistan. Each, for reasons of their own, will make every effort to move, and in some cases, sizeable amounts of cotton onto the world market. In spite of these efforts, these supplies will continue to remain burdensome into the MY 1993/1994 but should begin to fall off by the following year when planting decisions are made in the spring of 1994. Of particular interest over the next two years are China's production levels in light of the changing relationship between the central government and provinces, and the the timing of a recovery in the Russian mill sector and resolution of economic difficulties between them and the republics that produce cotton in FSU.

As with most industries, cotton and textiles are cyclical and low prices for both will force major changes longerterm. Cotton producers will turn to other more profitable crops until supply achieves a better harmony with demand and textile's spinning industry is already being forced to contract and reduce excess spinning capacity. As the global economy improves into FY1993 and 1994, consumption should increase which in turn should prove beneficial to cotton exports but only marginally.

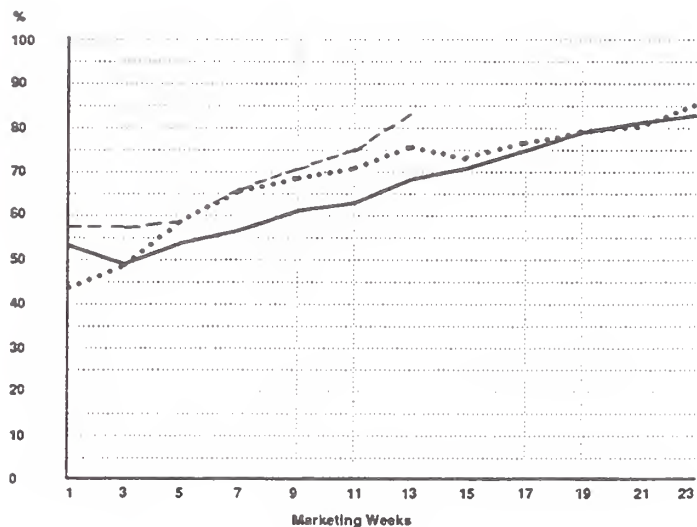
Several distinct trends in cotton and textile trade have become apparent and are unlikely to change in the foreseeable future leading to a world raw cotton trade that is more static than growth oriented. Both major cotton producing and exporting countries are using more cotton as their internal consumption has grown and exporting less. In addition, the exporting of value-added products such as finished and semi-finished textile goods has increased, competing and replacing raw cotton exports.

Various trade agreements, such as NAFTA and GATT, assuming they are approved, should positively impact consumption because of the economic growth and goodwill they will spawn. On the other hand, their effect on raw cotton trade appears limited, although NAFTA will enhance and insure cotton exports continue with Canada and Mexico.

US exports during MY 1992/1993 are projected within a range of 6.0 to 6.3 million bales. US ability to maintain market share will be difficult in the nearterm but as world ending stocks

moderate to a more balanced level, US exports should regain some ground and range between 6.0 and 6.7 million bales into marketing years 1993/1994 and 1994/1995.

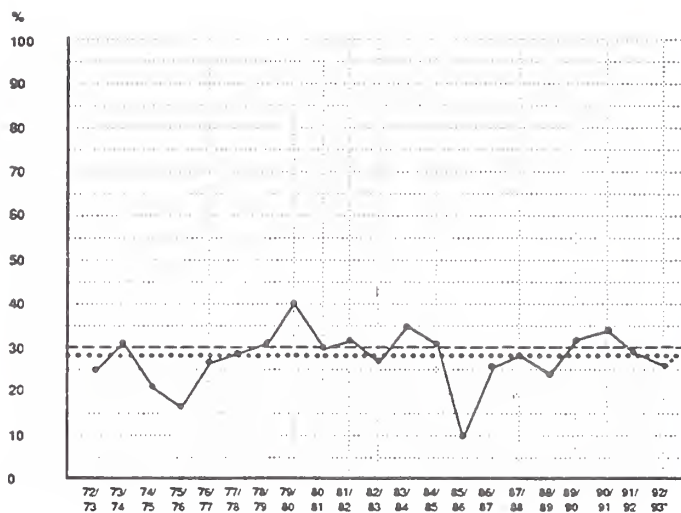
EXHIBIT 1
Rate of US Upland Commitments in 1992/93 versus
1991/92, and 5-year average (85/87 - 90/91 and 85/86 - 89/90)



--- 92 - 93
..... 91 - 92
— 5 - year average

Source: USDA

EXHIBIT 2
Percent Of US Market Share Of World Exports



--- 5 Year Average 30
..... 10 & 20 Year Average 28

Based On USDA Data

EXHIBIT 3
Cotlook "A" Index

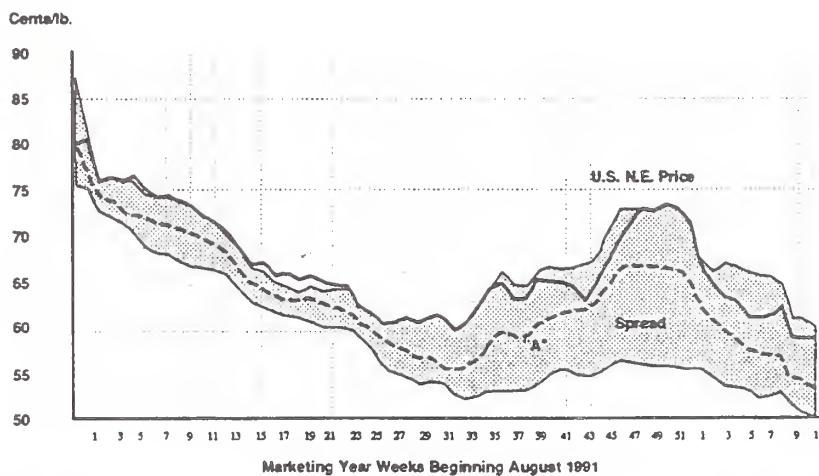
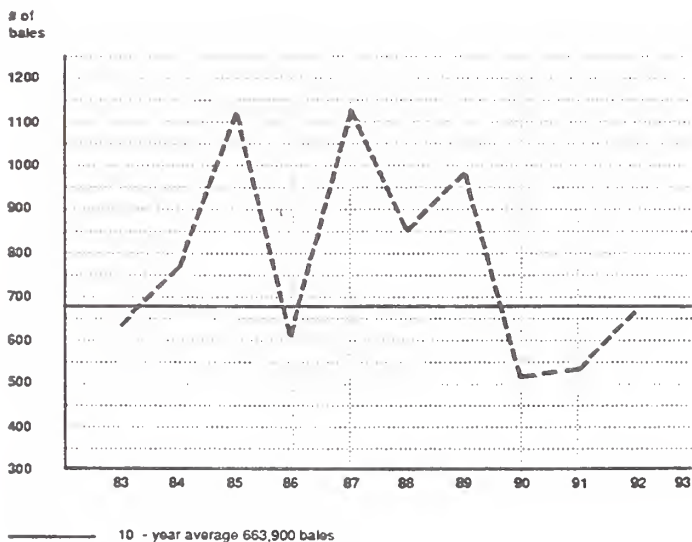


EXHIBIT 4
GSM-102 Cotton Exports
(bales in 000's and 480lb)



Source: CCC

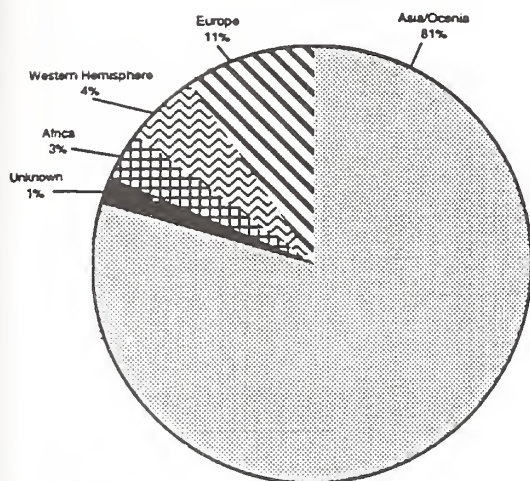
EXHIBIT 5A
Cotton Exports By Region 1991/92



Source: USDA

EXHIBIT 5B
1991/92 Cotton Commitments By Region
(as of 14th week of marketing year)

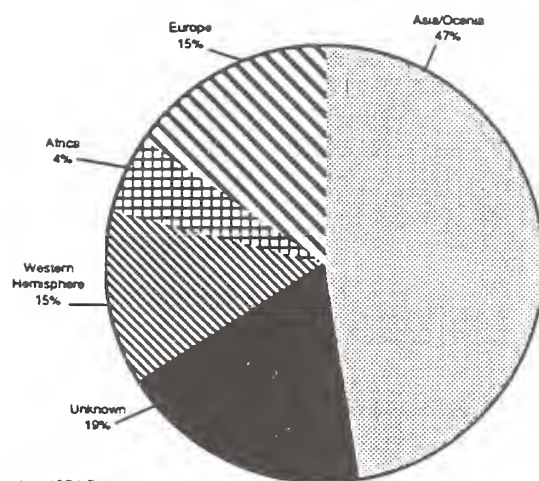
91/92



Based on USDA Data

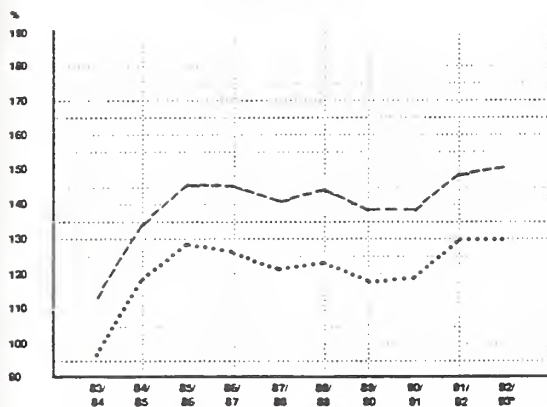
EXHIBIT 5C
1992/93 Cotton Commitments By Region
(as of 14th week of marketing year)

92/93



Based on USDA Data

EXHIBIT 6A
Foreign vs World Supplies
(million 480-lb bales)

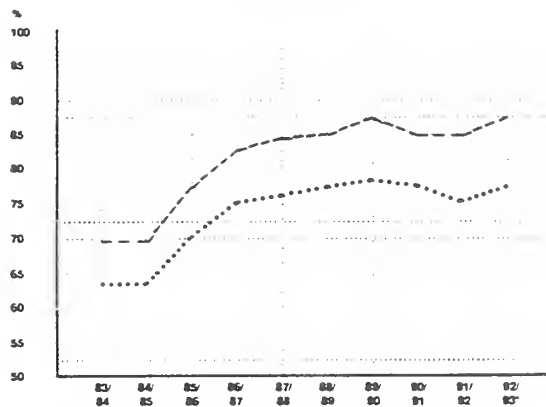


..... Foreign
----- World

* Projected

Source USDA

EXHIBIT 6B
Foreign vs World Usage
(million 480-lb bales)

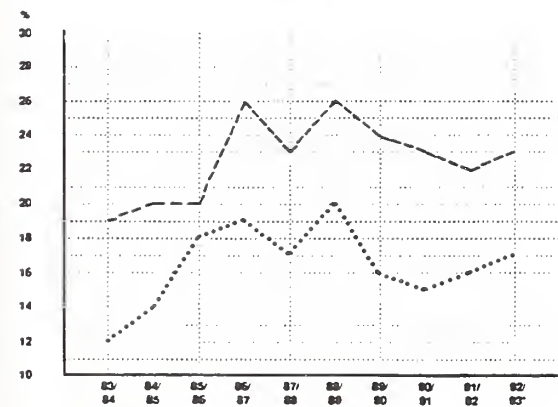


..... Foreign
----- World

* Projected

Source USDA

EXHIBIT 6C
Foreign vs World Exports
(million 480-lb bales)

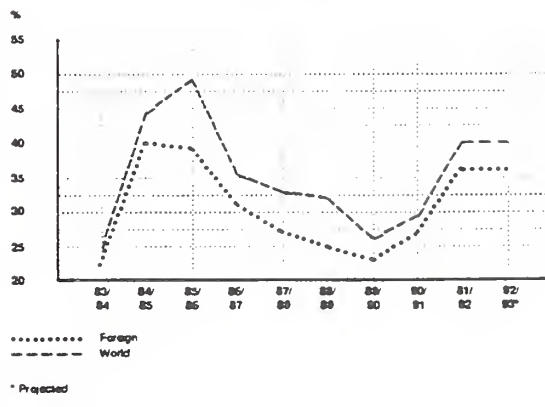


..... Foreign
----- World

* Projected

Source USDA

EXHIBIT 6D
Foreign vs World Ending Stocks
(million 480-lb bales)

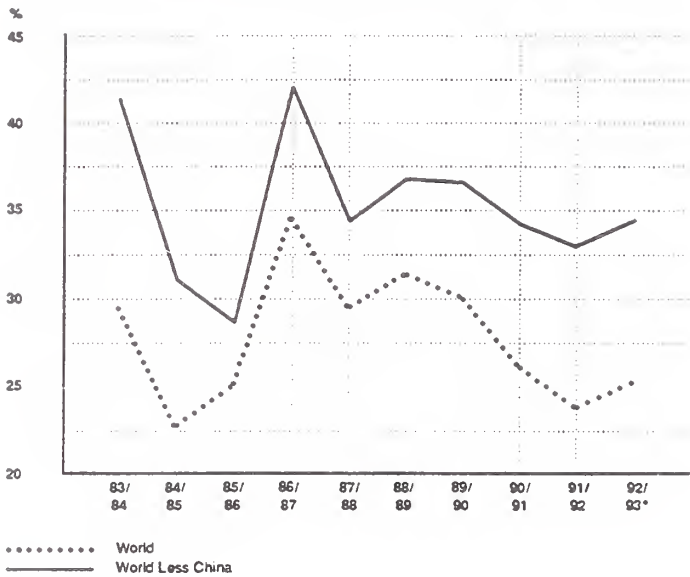


..... Foreign
----- World

* Projected

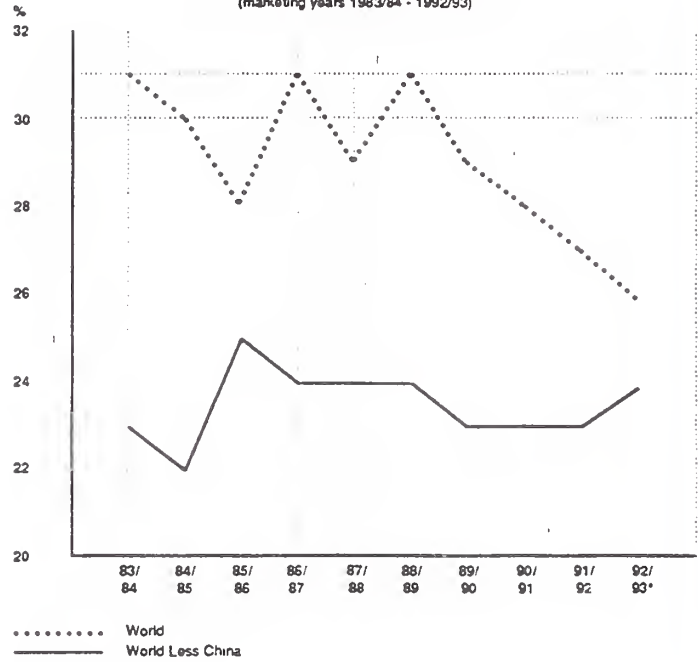
Source USDA

EXHIBIT 7A
Cotton Exports As A Percentage Of Production
(marketing years 1983/84 - 1992/93)



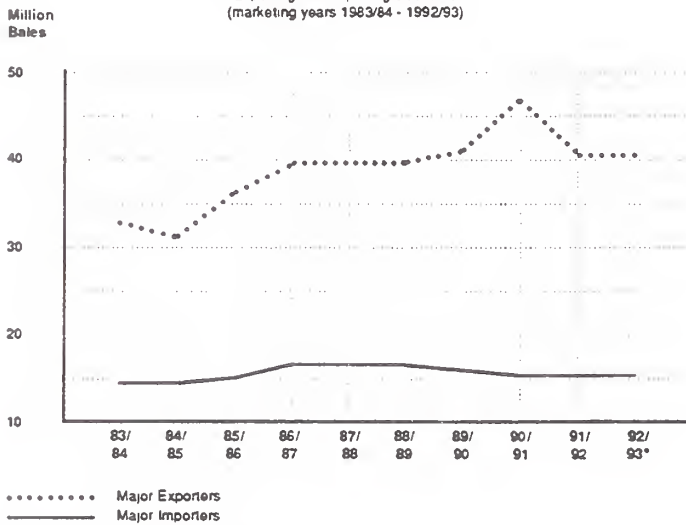
Source USDA/FAS
August 1992

EXHIBIT 7B
Cotton Exports As A Percentage Of Consumption
(marketing years 1983/84 - 1992/93)



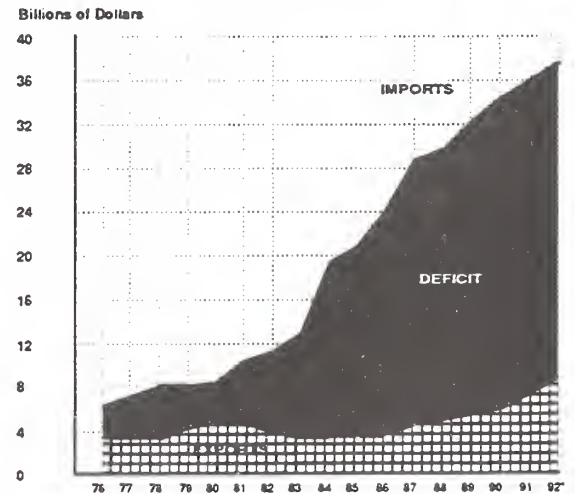
Source USDA/FAS
August 1992

EXHIBIT 7C
Consumption Growth In The Major
Exporting And Importing Countries
(marketing years 1983/84 - 1992/93)



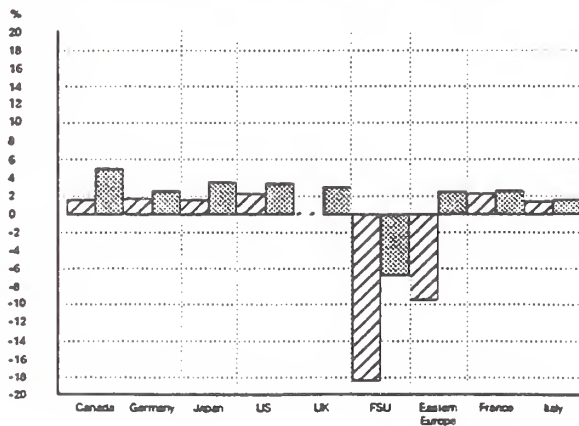
Exporters: China, FSU-12, Pakistan, U.S.
Importers: Germany, Indonesia, Italy, Japan,
South Korea, Taiwan, Thailand

EXHIBIT 8
U.S. Textile And Apparel Trade
C.I.F. Import Values, F.A.S. Export Values
Calendar Year Totals



SOURCE: U.S. Department Of Commerce, FT-135, FT-140, SITC
Classification 65 & 84.
* 1992 data are annualized based on the first six months of the year.

EXHIBIT 9
GDP Growth By Country 1991 and 1992 Forecast By International Monetary Fund



Outlook '93

For Release: Wednesday, December 2, 1992

HOW WILL CHINA USE ITS EXCESS COTTON STOCKS?

Carolyn L. Whitton and W. Hunter Colby
Agriculture Economists
Economic Research Service

China is the world's largest producer and consumer of cotton. During the 1980s it accounted for an average one-quarter each of world production, consumption, and stocks and about 5 percent of world exports even though in some years it was a net cotton importer. Because of its large share, movements in China's cotton quickly affect the world market.

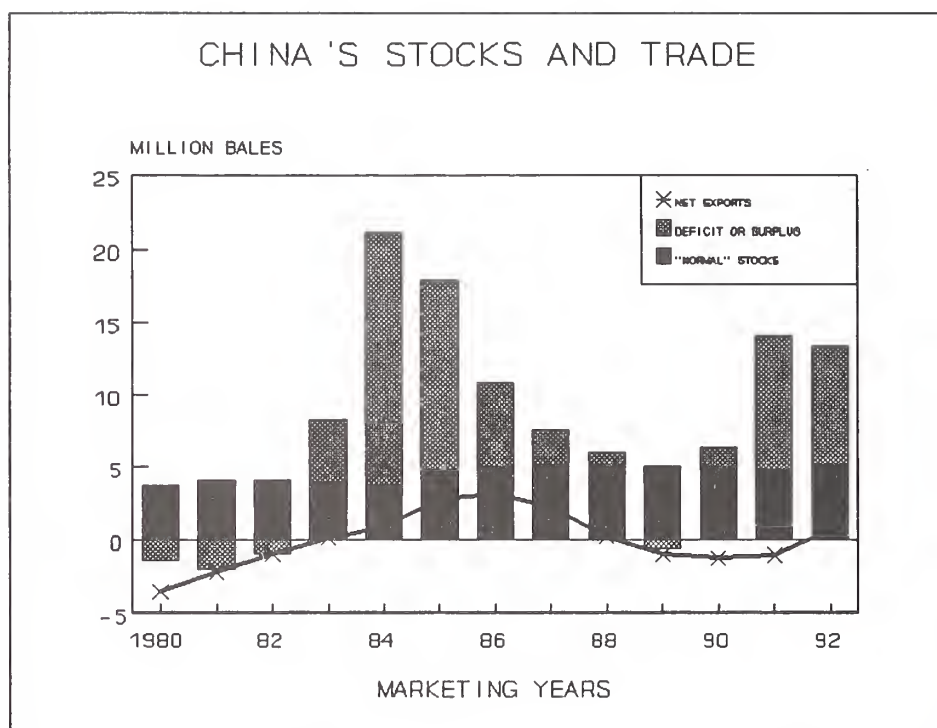
In the 1992/93 marketing year, China's cotton is expected to be in surplus despite less output than anticipated earlier. Production is estimated at 21 million bales, the third consecutive large crop and the fourth highest historically. Although considerably more area was planted this season, yields in the North China Plain, the major producing region, have been adversely affected by drought and insects and production is not as large as earlier anticipated.

Despite this, season's smaller output China still has a considerable surplus of cotton (chart 1). Carryin is the largest since 1985/86. Although imports are projected to be down over 75 percent, large production and carryin will combine to create excess availability. Only the 1983/84 and 1984/85 seasons produced a larger surplus than 1991/92 and 1992/93.

In terms of use, consumption is already beginning to recover from the depressed situation in 1991/92 as yarn production rises again. And, 1992/93 consumption is projected to reach 21 million bales, the same as production. At 1.1 million bales, exports are expected to nearly double last season's low level.

But gains in use are not sufficient to offset large production and carryin. Despite greater use, 1992/93 ending stocks and stocks-to-use ratio, at 13.3 million bales and 63 percent, are expected to be second only to the mid-1980's surplus. And, by the end of 1992/93, China's surplus cotton is forecast to reach about 8.1 million bales. (This figure is the 13.3 million bale projected ending stock figure minus a normal 25 percent ending stocks for 21 million bales of use.)

Since the beginning of 1991/92, world prices have fallen to low levels in part because of China's large contribution to world stock surpluses. World prices, represented by the A Index of prices on the Northern European market, averaged



only 63 cents per pound during 1991/92, well below the 83 cent average of the previous season and the 73 cent average since 1973/74. Although China has been a net cotton importer in the last three seasons, for six seasons from 1983/84 through 1988/89, it was a net cotton exporter--a position it could turn to again with the current surplus stocks.

Thus, China's current cotton surplus leads to an important set of questions. How will China dispose of its surplus? Will China export it? If it exports, how much will it export and will it export all at once, flooding the world market and further depressing world prices? Or is it more likely to consume most of this surplus? And finally, how soon will it begin to export or consume the surplus?

The answers to these questions are not clear cut. China's actions will depend on its policies. But, at present, its policies have just begun a period of flux and uncertainty. Bearing in mind the current uncertainty, we will do our best to describe the changes that are apparently occurring and present possible outcomes.

WHY DIDN'T CHINA EXPORT THE SURPLUS IN 1991/92?

China's cotton surplus began building in 1991/92. The stocks-to-use ratio at the end of that season rose from the previous year's not too unusual 32% to an excessive 72%. Yet, China lowered both its imports and exports in 1991/92 and remained a net cotton importer. Why did China not begin exporting its surplus cotton in 1991/92 and why did it add to the surplus in 1992/93?

Some of the explanation for lower exports in 1991/92, despite a near record crop, can be attributed to the excess being more moderate than the mid-1980s' surplus. China's 1991/92 ending stocks-to-use ratio, although high, did not approach the 140 percent stocks-to-use of 1984/85. And, although world prices began to fall, prices didn't drop near the 30 cent levels of the earlier surplus period. Central planners therefore, reacted with only moderate disincentives to reduce 1992/93 production.

Another part of the explanation may be found in the inflexibility of the central plan to react to changes in the situation after the plan is implemented. China's central government was not aware the extra gains in its 1991/92 cotton crop until early in 1992, well after its import and export plans for the year had been made and implementation begun. Centrally-planned economies are more likely to adapt to an unforeseen situation in the next year's plan than to change the current year's plan already underway.

In addition, the 1992/93 plan failed to fully take into account effects on cotton of market changes for other crops and instead assumed a past set of disincentives would result in the same decrease in cotton production previously achieved. Although the central government's input subsidies planned for 1992/93 remained unchanged, the Jiangsu, Anhui, Sichuan, and Zhejiang provincial governments announced decreased price and input incentives for 1992/93 cotton production. And, other major cotton producing provinces, including Shandong, Henan, and Xinjiang, continued the policy of no additional price or input incentives for cotton farmers. The provinces hoped these disincentives would decrease 1992/93 cotton area and production as similar disincentives had in 1986/87. But, in the intervening years, the government had also altered its grain policies, so the cross-commodity relationship between grain and cotton was no longer similar. In planning 1992/93 cotton policy, the government failed to account for the greater incentive that low grain market prices exerted on cotton, making state fixed cotton prices attractive even with reduced input incentives.

Still another factor influencing China's decision not to increase exports in 1991/92 was the relatively slow growth in world demand for cotton. Because of this slow growth, world trade has remained stagnant for 3 seasons and exports competitive. Slow growth of world demand helps hold world market prices down, making prices unattractive to China's exporters.

But, the most important explanation for reducing 1991/92 exports when the larger crop implied surplus cotton is that China's exporter prices were higher than world prices. Significant exporter subsidies would have been necessary to sell the surplus cotton abroad.

China's 1991/92 & 1992/93 fixed procurement price (the price paid farmers) is 300 Yuan/kg (excluding remaining additional provincial price supplements). When the Cotton and Jute Corporation, the state procurement agency, distributes cotton to exporters or mills, it charges only about half of the true cost of handling--transportation, processing, packaging, storage, administrative fees, etc.--which we estimate to be at least 0.50 to 0.70 Yuan/kg., out of a total real cost of 1.00 to 1.40 Yuan/kg., for standard

grade cotton. Thus, at a minimum the price to China's official cotton exporter, Chinatex, is estimated at 6.50-6.70 Yuan/kg., or, at the November 13, 1992 exchange rate of 5.56 Yuan/\$US, 53-55 cents/lb. However, some provinces reportedly pass on the cost of their additional price and input supplements to mills. We think it probable that exporters are also required by some provinces to pay prices that include some or all of the cost of the additional provincial incentives. We estimate the non-subsidized price to Chinatex to be at least 57-60 cents/lb at current exchange rates and more at earlier exchange rates.

But, the world price as measured by the average monthly A Index in northern Europe has been below 59 cents/lb. since January, 1992, except for the end of the 1991/92 season. Perhaps China held its 1991/2 surplus hoping both its own and world output in 1992/93 would decline and prices rise sufficiently for it to export the surplus in 1992/93 without resorting to subsidies.

WHY IS CHINA RELUCTANT TO SUBSIDIZE EXPORTS NOW?

We can think of 2 reasons China may not want to subsidize cotton exports further at present. China has a large and rapidly growing budget deficit which it prefers not to increase further. In addition, China's GATT membership is forthcoming and it needs to demonstrate both willingness and preparedness to trade within accepted world standards.

In 1981, shortly after China began instituting market reforms, its official budget deficit was just 2.6 billion Yuan. At the end of 1991, the deficit had risen to 20.3 billion Yuan, an increase of 516 percent over 1981. However, using more standard Western accounting practices, an estimate of China's "real" budget deficit by the *Far Eastern Economic Review* indicated a 1991 shortfall closer to 65 billion Yuan. Based on China's official figures, deficit growth has increased rapidly since 1986 and is now averaging 59 percent annually. If growth were to continue at this rate unchecked, a severe fiscal crisis would be likely in the not too distant future. Clearly, China's government must try to stem the growth.

Secondly, work has begun on a provisional protocol of membership for China in the GATT; China recently began answering GATT's questions on trade policy and its reform plans. The GATT working group on China's membership will meet again December 9. GATT has agreed to accept both China and Taiwan as members as soon as China qualifies; Taiwan has already qualified, putting pressure on China to do so. Although agricultural export subsidies are not presently prohibited by GATT rules, reduction and/or elimination of agricultural export subsidies is one of the main features of the current Uruguay round trade liberalization negotiations. Thus, if it becomes a member soon, China likely expects to be requested to address its current policies of subsidizing exports. In order to both demonstrate its willingness to abide by current and possible future GATT rules and to prepare its economy for eventual GATT membership, China is now trying to reduce its export subsidies somewhat.

In addition, China may expect that membership in GATT may eventually provide it better opportunities to export textiles, particularly if the GATT Uruguay

Round trade liberalization is eventually finalized and the Multi Fiber Arrangement phased out. If China expects improved textile export opportunities in the future, it may want to consume its surplus cotton in its mills rather than exporting it.

WILL POLICY CHANGES ALTER CHINA'S EXPORTS IN 1992/93?

At present, as far as we know, there have been no additional changes in government marketing policies for China's 1992/93 cotton crop. For 1992/93, as in most previous years, the central government will still procure virtually all of the cotton crop at state fixed prices and market this crop to mills or the central export agency, Chinatex, at prices similar to those in 1991/92.

In addition to Chinatex's exports, some provinces are exporting cotton. But, these provinces must obtain central permission and remit most of the foreign exchange earned to the central authorities.

For 1992/93, the one exception to normal policies that we are currently aware of is that Shandong province will be allowed to sell 20% of this year's cotton crop at free market prices. However, this is the usual government practice in response to natural disasters; Shandong clearly qualifies for natural disaster assistance this year.

For the most part then, the problem of China's export prices exceeding world prices may still exist during the 1992/93 marketing season. And, for the reasons mentioned above, China likely will continue its reluctance to increase export subsidies much in 1992/93.

We see only two ways that China is likely to export much of its 8 million bale surplus this season. One way is if world prices rise above the cost to China's exporters, enabling exports without additional subsidies. The other is if policy changes currently being proposed for next year, 1993/94, become retroactive to this year's crop.

On the other hand, it is also possible that China's 1992/93 exports could decrease. This might occur if sufficiently attractive 1993/94 policy reforms were announced early in 1992/93 marketing and led to provincial expectations of gains next year. Provinces then might hoard cotton this year for sale next year. This happened two years ago in the former Soviet Union's Central Asian Republics.

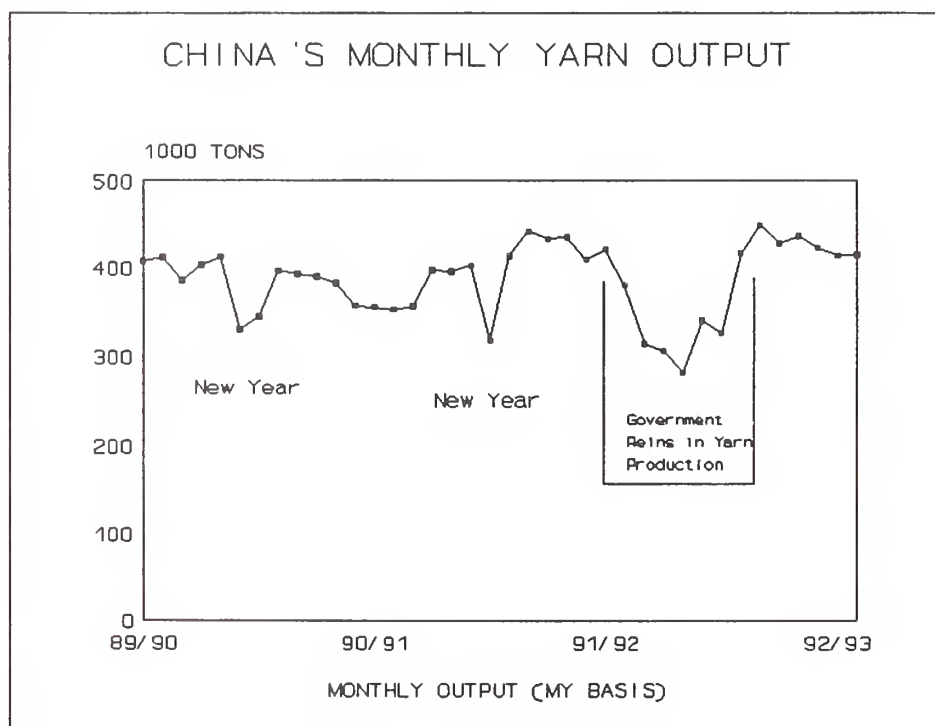
WILL CHINA CONSUME SURPLUS COTTON?

The recent rebound in yarn output suggests that the central government is now more concerned with finding solutions to the cotton oversupply problem, and the resulting budget pressures it brings, than addressing the problems of the state textile sector. At least in the short-run, government concern will focus on disposing of stocks and insuring steady textile export growth. As cotton stocks are drawn down, however, the government will likely return to addressing the seemingly intractable difficulties facing state-owned textile firms.

Despite recent attempts by central authorities to reform the state-run textile industry, we believe in the short-run China is likely to consume much of its surplus cotton. It might take a period similar to the 3 to 5 years required in the mid-1980s to consume China's currently estimated excess stocks this way, depending on developments in the international textile markets.

A whole host of problems are endemic to the state-run textile sector. The most immediate difficulties include a steep rise in unsold inventory, a large number of state textile mills operating in the red, and a decline in profits. In the three years 1989, 1990, and 1991, textile enterprise revenues reportedly declined 11, 39, and 13 percent, respectively.

Responding to the growing crisis, central authorities instituted a mandatory slowdown in yarn production in early 1991 in order to force textile mills to find markets for their unsold inventory (chart 2). China's cotton consumption, which had been stagnant at 20 million bales for a couple of years, dropped to 19.5 million bales in 1991/92 as yarn production plummeted in response to the government's mandate.



But, recent press reports indicate only modest improvement in either the inventory levels or the overall financial health of state textile mills. Between January and May 1992, purchases of textiles and apparel by the Ministry of Commerce declined and the stocks for 9 out of the 10 most important apparel goods rose an average of 47 percent. During the first half

of 1992, the number of loss-making textile enterprises increased by 4.7 percent over the same period in 1991. Profit remittances (taxes) to the central government declined by 25.8 percent and overall enterprise profits fell a sharp 60.9 percent.

Related to the fiscal problems of the textile sector, a recent report noted that IOUs are being given to cotton farmers this season because procurement stations are low on cash. Cash is short at local levels because procurement stations still hold large stockpiles of raw cotton not purchased by textile mills during the yarn downturn. And, cash flow problems are exacerbated because there are a large number of textile enterprises that have not paid for previous cotton supplies.

Yarn output numbers began rising rapidly again in spring 1992, signaling an end to 1991's yarn downturn. Now production exceeds the pre-adjustment monthly output level, pushing up expected 1992/93 cotton consumption.

Despite its intention to reform the textile system and make it profitable, the large surplus of cotton apparently pushed the government to back away from immediate textile reform and resolve what it perceives to be the more pressing problems associated with budget drain and cash flow caused by high levels of cotton stocks.

With yarn output numbers up again, central authorities are apparently pushing procurement stations to deliver increased amounts of procured cotton to mills, both to clear unsustainable levels of stocks and to increase the cash flow so farmers can be paid for cotton being delivered this season.

The short-term problems the government faces in insuring consumption of surplus cotton and pushing textile exports, combined with the long-term problems of reforming the state-run textile sector and making it profitable, suggest that the central government will not decontrol the textile sector as quickly as some other sectors.

PROSPECTS FOR 1993/94

Next year MAY be vastly different from the past because new farm policies are now being proposed at lightning speed for 1993/94. But, so far, only minimal information is available on what will actually be implemented and how this will differ from the past. We do not yet know even how widespread the new policies will be. And, without more information, estimating the effects of policy change is nearly impossible. Considering how little is yet known, projections for 1993/94 are still premature. We'll attempt only to indicate direction. Official USDA 1993/94 projections by country will be made in July 1993.

WHAT'S NEW FOR 1993/94?

According to USDA's attache in Beijing, in 1993/94 the cotton crop in at least one province, Henan, will be placed under provincial rather than central control. The province will establish its own procurement quota, act as its

own procurement agent, supply its own mills, and be allowed to export its cotton. In addition, Henan province has announced that it will not have quota grain or cotton area plans next year. However, farmers will also no longer receive the special input allocations that were tied to the quota area plans. There will continue to be an overall "guiding" production plan for the province, but it will not be allocated among the various prefectures and municipalities.

The attache also reports the central government already endorsed changing the procurement systems in Shandong and Jiangsu provinces in 1993/94 as well. But, no information on if or how these two provinces propose to implement such changes is yet available. Nor is it yet known if any other provinces besides these 3 will be granted similar policy alterations in 1993/94 or if the 3 will be test cases for future potential reforms.

BUT TOO MANY UNCERTAINTIES REMAIN FOR 1993/94

Unfortunately, a large number of unknowns remain even in the case of Henan. It is these unknowns that would lead to interpretations of the likely differences, if any, between the past's strict central control of cotton and future practices. Questions for 1993/94 fall into several main categories: free market cotton sales, determination of prices, responsibility for profits or losses and costs and subsidies, competition between provinces and the question of equality, and the disposition of foreign exchange.

The answers to the many questions will help determine some of the unknowns. For example, if cotton procurement prices are still fixed, cotton likely still will be attractive relative to grain. On the other hand, if free markets determine prices, it's unclear if cotton will be any less attractive than grain--whose price is already mainly free market determined.

Or, if provinces are allowed to retain foreign exchange from exports, then how will the central government earn the money it needs to balance its budget? But, if the provinces don't earn some of the foreign exchange, what is their incentive to export? If procurement agencies are responsible for being profitable, then they may either procure more slowly or sell more rapidly, shifting the costs of stock holding upstream to farms or downstream to mills and exporters. But, if exporters also need to show a profit, then in an effort to hold down rising costs they may be likely to export more rapidly, even if it is at a loss.

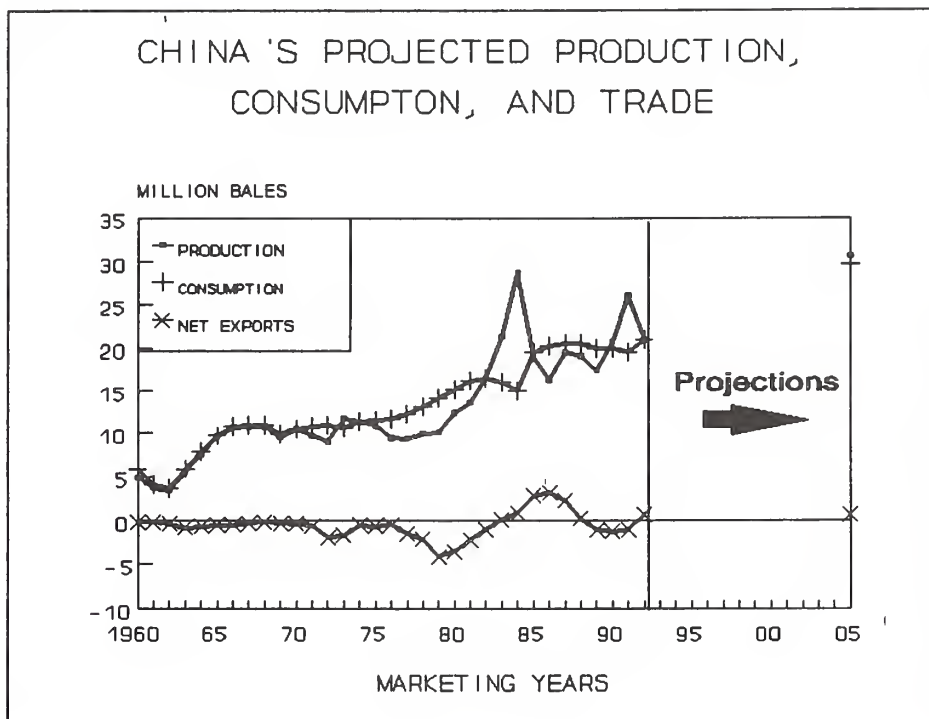
These are only a small selection of the potential questions for 1993/94. But even from this sample it's clear that additional information will be essential in deciding the outlook for 1993/94 cotton and other crops in China. Hopefully, more details about policies will be released in coming months.

WHAT CAN WE SAY ABOUT 1993/94?

Numerous policy changes are likely for all crops. But, it may take quite awhile for the effects of these changes to be sorted out because of many potentially offsetting factors.

Production

For cotton production, on balance the negatives may offset the positives. Cotton area likely will drop somewhat in 1993/94 (chart 3). Yields may also fall. If so, then production will decline.



On the positive side, China's cotton prices may remain attractive relative to grain prices because consecutive bumper grain crops continue to depress free market grain prices, keeping farmer's returns from grains low. Recent reports of IOU use by cotton procurement stations suggests a substantial disincentive to planting cotton next season. However, IOUs are also appearing in grain procurements, and continued downward pressure on grain crops means that although the incentives for cotton are reduced, they will still likely continue to be good relative to grain.

But, on the negative side, difficulties selling China's current cotton surplus must have a depressing effect on China's 1993/94 cotton area and production. Receipt of IOUs in payment, will only enhance this effect. In addition, low world prices may have some adverse effect, however indirect that effect may be.

Secondly, with all the policy changes being proposed, the uncertainties about how they will be implemented, and the impossibilities of accurately predicting their cross-commodity effects, farmers are likely to try to reduce risk in 1993/94. Instead of planting only cotton, cotton farmers may diversify in

1993/94 until they can better determine which crops offer the best returns. Since cotton and grain may be equally unattractive, diversification might benefit fruits and vegetables or oilseeds.

In addition, individual provinces announced for 1993/94 stricter elimination of extra incentives previously allotted for cotton. Removal of incentives, such as fertilizer subsidies, will either raise cotton production costs relative to those of other crops or reduce input use and therefore yields. Most likely some of both will occur.

Finally, much of the 1993/94 cotton area is already decided. Winter planting occurred in October without major change in relative crop prices. North China farmers, when planting wheat, also made a preliminary decision to plant cotton next spring--spring cotton is double-cropped and interplanted with winter wheat in this major producing region. Winter wheat area rose/fell. These producers are only likely to switch to another cash crop next spring if there is one with higher expected returns. This will depend on the price of cotton relative to competing grain and non-grain crops. Although we expect cotton to remain more profitable relative to grain, other competing crops, particularly vegetables & other high-value crops, may absorb a limited amount of cotton area, particularly in cotton surplus regions. The effect of the ongoing marketing and price reforms on relative crop prices is difficult to foresee, but will be certainly be the major factor in the cotton farmer's decision to move away from growing cotton.

Consumption

Cotton consumption, however, is likely to rise again in 1993/94, continuing the rapid growth already begun this year. Of course, this will depend on continuing optimism that textiles can be sold either domestically or abroad. Continued strong income and population growth in China will fuel these expectations domestically, as will the turnaround anticipated in world economic growth. Although it is certainly possible, we nonetheless think it unlikely that the central government will pass control over state-run textile enterprises to the provinces because textile exports are one of the government's largest sources of foreign exchange earnings.

In addition, although not yet officially confirmed by government authorities, the Far Eastern Economic Review recently reported a central government plan to triple oil prices in China to near international market levels in January, 1993. If this happens, it will not raise energy costs for the textile sector too much because three-fourths of China's energy needs are supplied by coal. However, petroleum-based chemical fiber production costs would rise precipitously. That increased cost would likely reverse the trend of the last few years and instead increase cotton fiber consumption while decreasing chemical fiber use.

Trade

Given the current surplus situation, China is unlikely to import much cotton in the next few years until cotton stocks are worked down to normal again. A

small quantity of cotton probably will be imported annually, principally by joint-venture enterprises or for specialty uses.

Assuming provinces control cotton exports, but not textile exports in 1993/94, provinces likely will try to export as much cotton as they can if they have control of at least some of the foreign exchange earned. China's cotton exports in 1993/94, however, could well be higher than those anticipated for 1992/93 and are likely to remain strong until the surplus is exhausted. But, it is not likely that China will attempt to export all or most of its 8 million bale cotton surplus in one year. This could only be done at a considerable loss to whomever in China is responsible for the 1993/94 exports because so doing would certainly depress world prices further. Since it is likely that China, or its provinces, still want to earn as much foreign exchange as possible, exporting it all at once probably represents the least likely, worst case, scenario.

China is more likely to try to export and consume its surplus cotton over a period of several years. Consumption growth is likely to continue and exports, while they may fluctuate, are likely to remain strong.

BEYOND 1993/94

In the long-run, China could be either a net exporter or a net importer of cotton in any given year. But, if cotton continues to be relatively attractive on the world market and China's grain crops keep pace with expanding demand, then China probably will try to produce enough cotton to both satisfy its growing textile industry and export some. The more foreign exchange it can earn, the faster domestic development can proceed.

Of course, textiles, a value-added export, potentially can earn more foreign exchange than exported cotton. On the other hand, nearly all the developing countries in the world are already trying to expand their textile exports. And at some point, the textile export market will reach saturation (this point will depend on the willingness of countries like the U.S. and the EC to continually absorb more textile imports). For countries like China that produce and export both cotton and textiles, rapidly expanding textile export competition would again increase the attractiveness of cotton exports relative to textile exports.

In the long-run, China, like other developing countries, wants to maximize foreign exchange earnings. Thus, it's likely to try to at least maintain, if not expand, both its cotton and its textile export markets and to avoid, whenever possible, using its valuable foreign exchange for importing more than a small quantity of specialty cotton.

SUMMARY

China currently has an estimated 8 million bale surplus of cotton which it could export or consume or both. We feel it is most likely that China will both export and consume this cotton gradually over a period of years similar to the 3-5 years needed to use the mid-1980's surplus.

Cotton exports will be limited by China's reluctance to increase export subsidies. This reluctance is based on both the need to control a large and rapidly rising budget deficit and on China's need to demonstrate willingness and preparedness to reduce export subsidies to become a GATT member. But if provinces gain control over both cotton exports and foreign exchange earnings, the incentive to earn may be strong enough to raise China's 1993/94 exports above 1992/93. China isn't likely to export the surplus all at once because so doing would drastically reduce potential foreign exchange earnings.

When faced with surplus cotton, the central government apparently has opted to first solve the short-term problems of budget drain and cash flow that accompany high cotton stocks, thus raising cotton consumption as well as exports. The 1991 attempts to reform the state-run textile industry have temporarily been put on hold.

In the long-run, China still is striving to maximize foreign exchange earnings. To do so it likely will need both cotton and textile exports to remain competitive.

Outlook '93

For Release: Wednesday, December 2, 1992

A FARMER'S VIEW OF COTTON'S FUTURE**Marshall Grant
Farmer of North Carolina**

Cotton growers, better than any other commodity group, have worked hard and long to identify and work to overcome their industry problems, bringing them to a position to expect a solid future. By bringing all segments of the cotton fiber industry together, to sincerely work together, they now have a research and promotion program which has, and continues to improve its position in the fiber market, overcoming opposition from all directions, such as importers, national retailers and Government opposition, but in the final form all pitching in to collect assessments from all cotton fiber sold in the U.S.A.

Second most important success story, which our future is dependent on is a very complex farm program for cotton producers. Again, cotton has been successful because of its unity, to develop, with the help of strong leadership from Congress and U.S.D.A., a cotton program that helps us overcome the devastation of surplus production worldwide. By having a program that permits U.S. cotton to always be competitive in world markets, prevents the historical cycle of cotton buildup in surplus years. For several years this often left us out of competition in world markets, with a devastating effect on growers and eventually very costly to the government loan program.

A factor also lending strength is the commitment of the American textile industry to keep itself competitive around the world. After World War II, the U.S.A. provided vast amounts of foreign aid to help other nations improve their economy. Textile production received large amounts of aid because it provided many jobs for nations with large unemployment. Because of this, many Third World nations had more modern facilities than the U.S.A. Our textile industry has worked hard and continues to update their equipment and technology to remain among the most "up to date" of any textile producers and are systematically increasing the amount of cotton used at a fairly healthy rate.

A third, and I think significant implication for the future is what is happening in the cotton fields of U.S.A. growers.

The single most important good thing to happen to cotton production for the long term is the Boll Weevil Eradication Program. The program is expensive to growers and U.S.D.A (70% Grower, 30% U.S.D.A.) but has progressed to the point that the reduction in cost of production makes it necessary for other areas to also eliminate this pest.

This very progressive step came at a very important time for the Southeastern part of the Cotton Belt, which many feel will now be able to reverse downward trends in cotton production in the east as the west gets greater pressure from its urban neighbors for the use of its high priced water.

There is little doubt it saved us in North Carolina. We were down to about 45 thousand acres when the program began in 1978. The past two years our average is about 400,000 acres, this bringing with it a 40 to 50 million dollar investment in Gins and equipment for North Carolina alone.

Along with this is the promise of bio-technology which holds promise for all kinds of good things in the fairly near future, such as gene implants to make the cotton plant resistant to worms, the most important insect after the Boll Weevil. Progress is continuous and fairly rapid in improving the quality of rain grown cotton, enabling our research people to prove its ability to compete with synthetic fiber and permit our textile mills to speed up their equipment, improving their efficiency.

Farmers will continue to work hard to provide improved fiber to our consumers. If we can continue to get cooperation from Congress in the form of present cotton programs and the help of U.S.D.A. in continuing to assist in administering it and the expansion of Boll Weevil Eradication along with the research we must have, we will expand our industry in the next 10 years in spite of our problems with environmentalists and tight money availability.

Outlook '93

For Release: Wednesday, December 2, 1992

U.S. RED MEAT AND POULTRY OUTLOOK AND NORTH AMERICAN TRADE ISSUES

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Economic Research Service, USDA

The outlook for red meats and poultry is one of record total meat production. Per capita consumption of all meats will likely increase to 212 pounds retail weight, up from 1992's record of 209 pounds per capita. Poultry and pork will be the main sources of increased meat production. Beef and other red meat will keep pace with population growth. These added supplies will keep pressure on meat prices in 1993, even as income growth picks up with accelerating economic growth. Producer incomes will stabilize or decline slightly. Lower product prices for some meats will be partially offset as lower costs of feed, corn, oil meals, and forage will hold down production cost. Competitive prices and a favorable U.S. dollar will continue to make beef, pork, and poultry exports competitive in the international market. Beef, pork, and poultry will again make major gains in exports. The impact on consumer prices of higher supplies should result in little price change for 1993 over 1992.

BEEF: The outlook for beef is for continued growth in cattle numbers to around 102 million head on January 1, 1993, up about 2 percent over a year earlier. This growth in cattle numbers is expected to peak in 1996-97 at about 107 to 108 million head, finishing the growth phase of this cattle cycle which started from a low of 98 million in 1989. Prior to 1980, cattle cycle growth has been much more robust, gaining about 20 percent from trough to peak. This cycle will be much more modest, gaining only at half the rate of most cycles, but double the short lived 1980 to 1982 increase. Beef supply response is limited by the expansion plans of poultry and pork producers, who can respond faster to price and cost changes. The continued growth in poultry production is a major factor slowing the expansion in the cattle cycle. Currently pork production is setting new records.

Reflecting the past growth in cow numbers, the calf crop likely will increase less than 2 percent this year and again in 1993. Feeder cattle imports from Mexico and Canada could be up 7 percent in 1993 over 1992. Lower priced feed will fuel the demand for more feeder cattle from both domestic and imported sources. The increase in calves and imported cattle, plus yearling inventory should increase the total supply of animals available for slaughter or retention by more than 2 percent in 1993.

Relative free trade conditions in feeder cattle movement to the U.S. from Canada and Mexico are providing in 1992 about as many feeder cattle to the U.S. as herds in these countries can support. If adopted, NAFTA would maintain free trade by reducing tariff and non-tariff barriers. An example of an action that would be prohibited by NAFTA is the November, 1992 increase in tariffs by Mexico on imported feeder cattle, fresh, and frozen beef of 15, 20 and 25 percent, respectively.

Beef production is forecasted to increase about 1 percent in 1993 as more animals are slaughtered. The average carcass weight per animal in the slaughter mix will be little changed in 1993 from 1992. However, individual steer and heifer weights should increase slightly, but additional cows in the slaughter mix will hold down the overall average cattle weight.

Beef's deficit net trade position is expected to narrow in 1993 as exports increase faster than imports, closing the gap by 145 million pounds. Exports are expected to increase 10 percent in 1993. Additional exports to Japan and Korea will be the major force behind export growth for beef. As of April 1, 1993 Japanese tariffs on beef will decline to 50 percent, falling from 60 percent in 1992. This will be the last negotiated decrease under the 1988 agreement to remove beef quotas and replace them with tariff equivalents. Korea is expanding their quota as scheduled, but are expected to exceed the quota amount as they have done in 1991-92. Lower tariffs in Japan and the decline in the value of the dollar have made beef a more attractive buy in the Pacific Rim. Added growth in beef exports is also contemplated between the U.S. and Canada and to Mexico. However, recent tariff increases by Mexico if left in place could severely disrupt U.S. exports to Mexico.

Beef imports are expected to decline slightly as the Meat Import Law (MIL) trigger level declines slightly according to ERS estimates. Given the dynamics of the MIL we will see a slight decline as more cows enter the slaughter mix for 1993 as part of the counter cyclical numerator. But as earlier levels of cow slaughter begin to drop out of the previous 5 year average in the denominator, we could expect increased trigger levels beyond 1993.

Voluntary restraint agreements (VRA'S) were negotiated with Australia and New Zealand starting in mid 1992. If the expected growth in the Pacific Rim markets occurs, this should relieve some of the pressure on the North American market, making VRA's unnecessary for 1993. However, recent actions in Australia and New Zealand where meat exporters are not being charged for use of containers holding meat that is going into bond have induced shipments into bond through mid-November that is beyond the VRA level. This could exacerbate the supply available under the MIL in 1993, requiring further VRA's to avoid quotas. Mexico's tariff increase, if continued, will also pressure Australia and New Zealand into finding other markets, again placing pressure on U.S. and Asian markets.

Trade flows for the U.S. for 1993 should continue to sharpen recent trends. Feeder cattle, which recently have had little in the way of border restraints in terms of tariffs, should continue to flow from Mexico and Canada to the

U.S. The proposed North American Free Trade Agreement should solidify this trend, as cattle in areas far from centers of consumption in Canada and Mexico are drawn to U.S. feedlots. Slaughter cattle will move south from western Canada, and north from the U.S. into eastern Canada. Fed beef will also flow increasingly from the U.S. to Canada, Mexico, and the Pacific Rim to fill the market for more marbled beef. Oceania should continue to be the dominate supplier to the U.S. for manufacturing beef in the near term. Beef export demand will continue to be highly dependent on economic and income growth around the world.

Prices for beef producers will be slightly lower to unchanged for feeder cattle, fed animals, and cows. Yearling feeder cattle prices may average a \$1-2 per cwt. lower in 1993 than this year. Fed cattle prices are expected to drop about \$1 per cwt. while cow prices show little change from 1992's average. The downward price pressure results from record supplies of pork and poultry as well as slightly larger beef supplies.

Retail and wholesale prices for beef are expected to be about unchanged in 1993 compared to 1992. Retail prices will hold steady as the declines in farm level beef prices are used to offset increased distribution costs. Demand for beef will be tempered by the large supplies of competing meats, maintaining pressure on retail prices.

Producer returns are expected to decline as producer prices fall. However, part of the decline in producer revenue will be offset by lower feed costs. Items of non-farm origin will increase slightly to complete a picture of slightly tightening net returns. Returns above cash costs to cow calf producers will be near \$74 per cow in 1993, enough to maintain current expansion plans.

PORK: The December 1992 hogs and pig inventory will probably be one of the largest on record. The December inventory is estimated to be up 5 percent in 1992 from 1991. This will continue the year-long pattern of inventory increases in market hogs, setting the stage for expanded production in 1993.

Commercial pork production in 1993 is forecasted to increase to 17.8 billion pounds, up 3 percent from 1992's record of 17.2 billion pounds. The previous record was 16.4 billion pounds that was set in 1980. Average carcass weights in 1993 are expected to average about the same as 1991 and 1992's 181 pounds. The relative high carcass weight allowed 1992 to set a new production record over 1980 even though the number of head slaughtered in 1980 was larger.

Trade in pork and live hogs is narrowing the net pork trade deficit. Pork imports in 1993 should be near the 1992 level of 650 million pounds. However, lower hog prices, and a favorable exchange rate should increase pork exports about 12 percent, to 460 million pounds. The pork trade deficit has been cut to a third of the 1990 level as exports increased and imports declined. Countervailing duties on Canadian hogs have shifted Canadian exports to the

U.S. from live hogs to pork and this is an area of continuing trade concern. NAFTA if approved could open Mexico up to added exports from the U.S.

Producer prices for hogs are expected to drop about \$1 per cwt. in 1993 as production expands. Hog prices in 1992 should average about \$41.50 for the year. The 1993 price decline follows the rather strong drop in early 1992 when prices declined to the upper \$30's in the first quarter from the 1991 average of \$48.78.

Retail prices for pork are expected to be near the 1992 price level in 1993, at just under \$2 per retail pound. Both 1992 and 1993 will represent a drop in retail prices from the 1990-91 record of \$2.13 per pound, as production increases sharply in 1992-93. Given the level of price decline and production increases, there still appears to be continued strong demand for pork products.

Pork producers net returns have been under pressure in 1992 with cash costs slightly greater than gross returns. However, receipts still exceeded variable cost in 1992, encouraging continuing production. In 1993, lower feed costs will offset slightly lower hog prices, and should boost net returns above cash expenses, helping to maintain high levels of production.

SHEEP: Lamb and mutton production for 1993 is expected to equal the 1991 production level after a 2 to 3 percent decline in 1992 from 1991. Per capita consumption of lamb and mutton will be unchanged in 1993 from 1992 and slightly lower than 1991. Trade for 1992-93 should be unchanged from 1991 levels. Prices for sheep and lambs will decline slightly in 1993 as large supplies of competing meats pressure prices.

BROILERS: Broiler production is expected to be up 3 to 4 percent in 1993 from 1992. This reflects a slowing from 1992's 6 percent increase in production as net returns to broilers tightened. Broiler production continues to set records each year and 1992 and 1993 will not be an exception to this trend. Per capita consumption will be up almost 5 percent in 1992, and up over 2 percent in 1993.

The 12 city wholesale broiler price is expected to be about unchanged in 1993 from 1992's expected 52.3 cents per pound. Prices for 1992 are expected to average just slightly above 1991. Retail prices are also expected to remain static at around 87 cents for whole fresh fryers, having averaged this since 1991.

Net returns for broilers decreased in 1992 but were still positive as production surged and prices declined slightly. Stable broiler prices for 1993 and falling feed costs should improve net returns to broiler producers.

Broilers exports reached a record in 1992 and likely will increase slightly in 1993. Broiler exports climbed 11 percent in 1992 in part aided by EEP sales. Prospects for additional exports in 1993 depend on world demand, but lower priced dark meat has enabled the U.S. to compete. However, recent increases

in trade barriers in the South Africa, Venezuela, and Guatemala in the form of higher tariffs could slow the rate of export expansion for broilers.

Poultry exports to Mexico have been increasing rapidly in recent years. The NAFTA proposal will establish a tariff rate quota (TRQ) of duty free imports for Poultry at 95,000 tons starting in 1994 and will grow at 3 percent annually for 10 years. A high over quota tariff will be established and phased out over the transition period. Since recent U.S. poultry exports to Mexico have been near the TRQ, future growth will be slowed to the 3 percent rate of increase for the next few years.

TURKEYS: Turkey production is expected to be up 2 percent in 1993 compared to a 4 percent increase in 1992. Turkey prices in 1992 averaged about a penny below the 1991 level. Net returns fell below the break even level for 1992, likely resulting in a retrenchment on expansion plans for 1993. Slightly higher turkey prices in 1993 and falling feed prices should improve net returns above break even levels. Turkey exports are continuing to grow rapidly from a small base in 1988-90 of about 50 million pounds to 103 million in 1991. In 1992, exports will increase about 50 percent from the 1991 level and a 9 percent gain is forecasted for 1993. Turkey exports have more than tripled in 3 years time and now equal to about 3 percent of production.

EGGS: Egg production increased 2 percent in 1992, to the largest production level since 1988 and producers experienced losses. A slight decline in production is expected for 1993. Egg exports for 1992 and 1993 are expected to be near the 1991 level of 154 million dozen. Egg prices in 1992, at 65 cents per dozen at the wholesale level, were 10 cents lower than 1991. Wholesale egg prices in 1993 are predicted to increase a nickel. Net returns for egg producers were negative in the first half of 1992. Net returns should be positive for the rest of 1992 and into 1993.

Figure 1
Cattle Inventory, January 1
 Million head

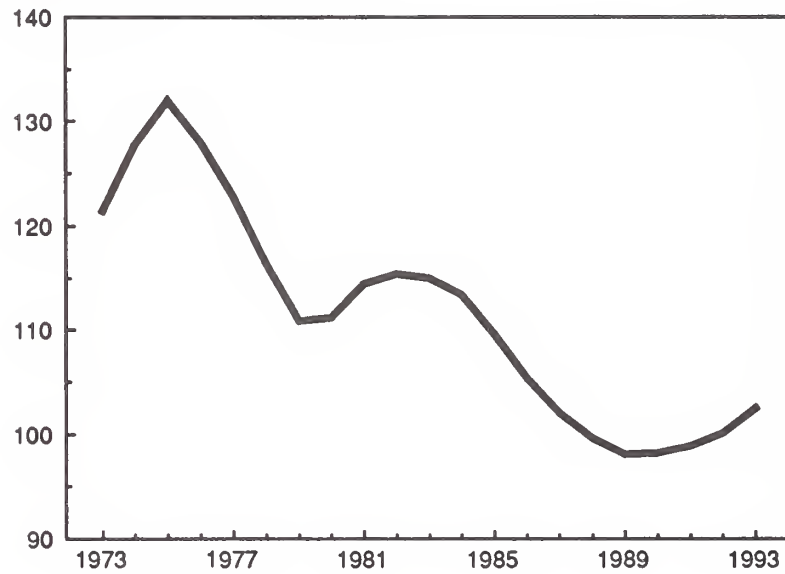


Figure 2
Beef Production and Prices
 Million pounds

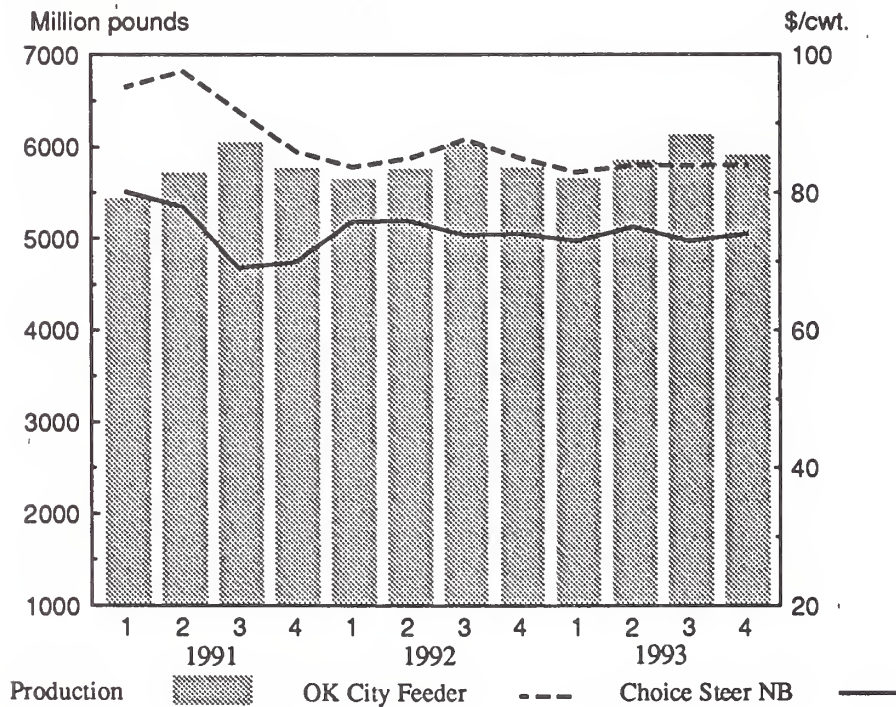


Figure 3
Beef Cow-Calf Net Returns
\$/cow

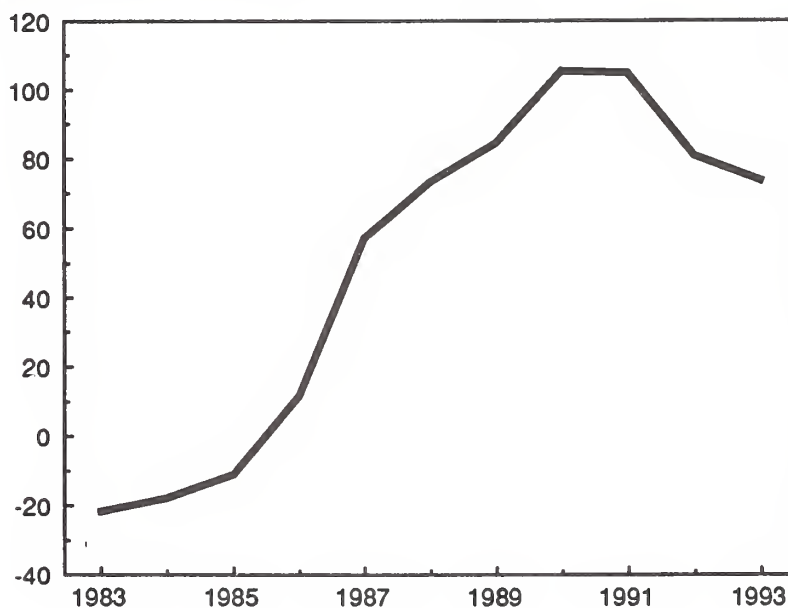


Figure 4
Hogs and Pigs Inventory
Million head

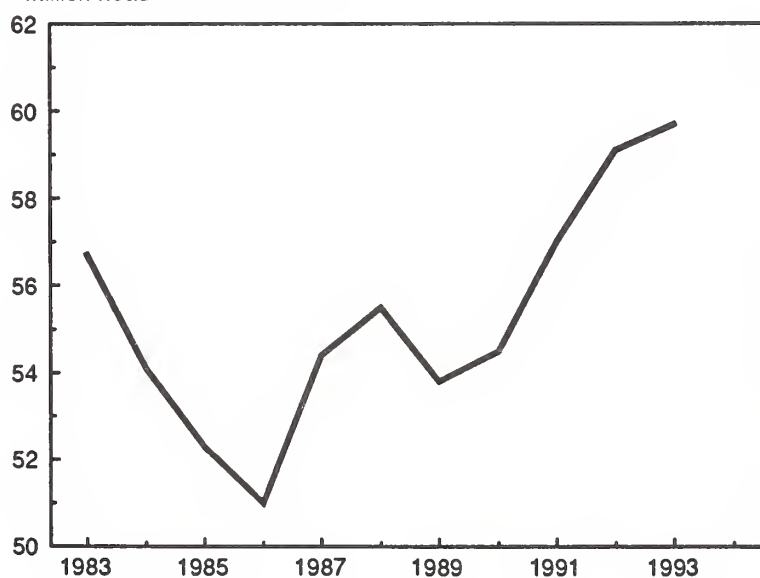


Figure 5

Pork Production and Price

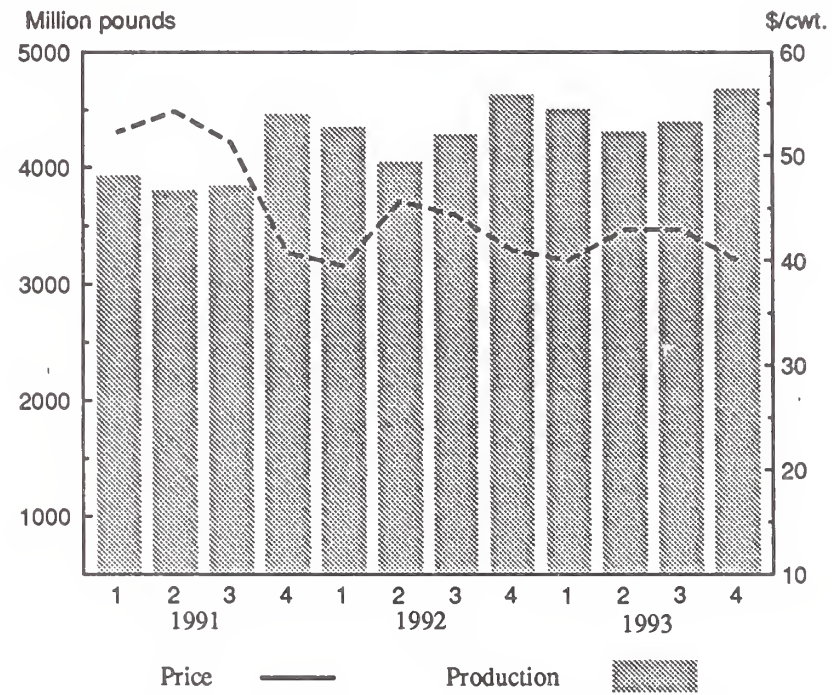


Figure 6

Hog Farrow-to-Finish Net Returns

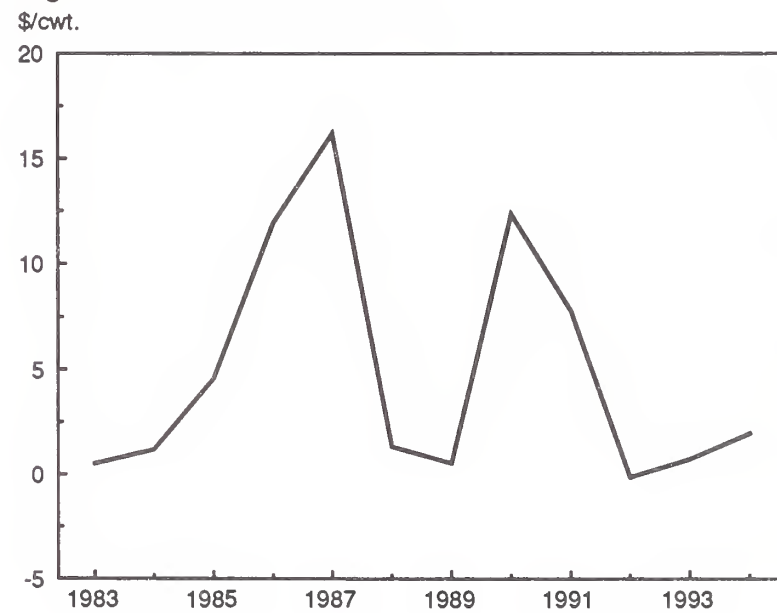


Figure 7
Broiler Production and Prices

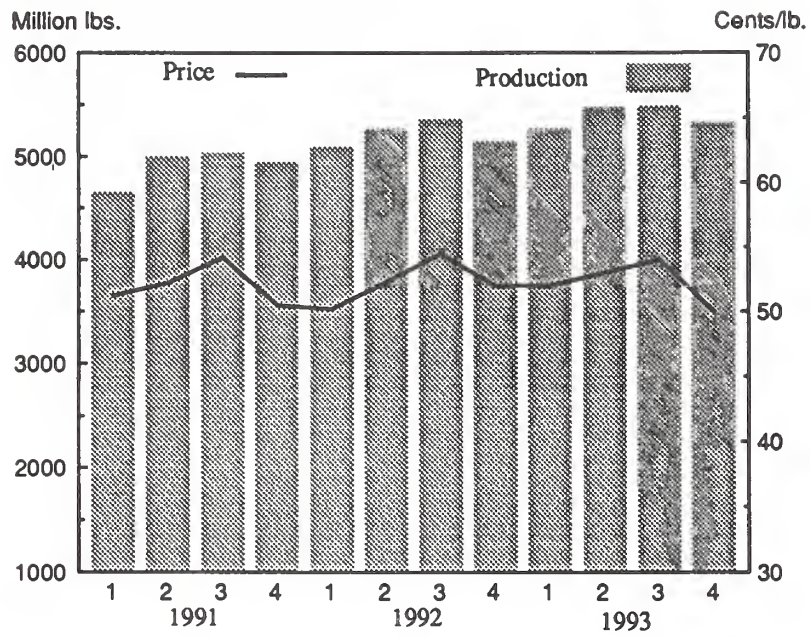


Figure 8
Broiler Net Returns
 Cents/lb.

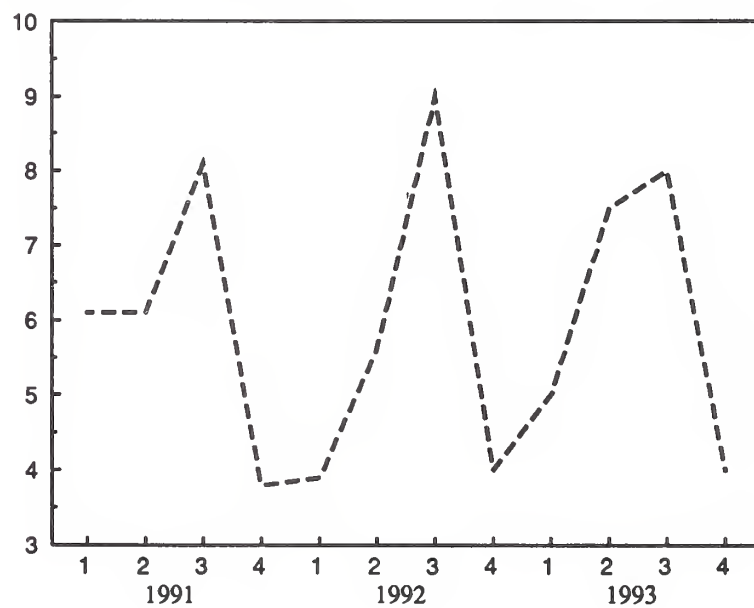


Figure 9

Turkey Production and Prices

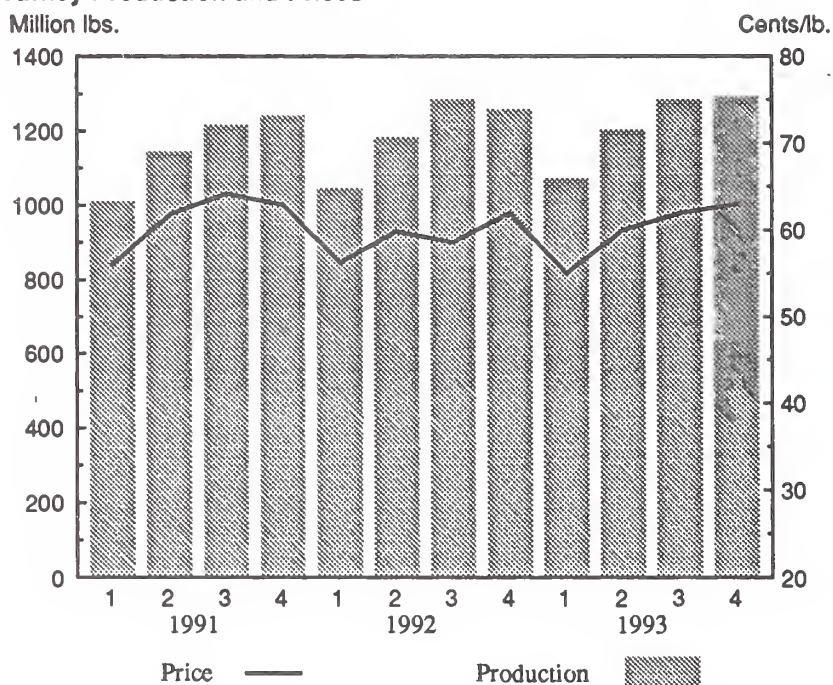
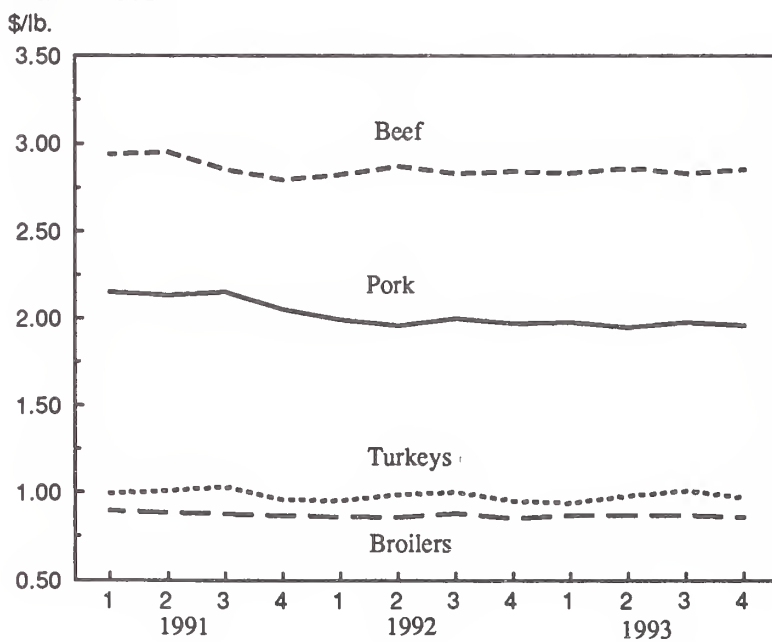


Figure 10

Retail Prices



Outlook '93

For Release: Wednesday, December 2, 1992

THE EMERGING NORTH AMERICAN RED MEATS AND POULTRY INDUSTRY

A CANADIAN PERSPECTIVE

Jane Owen

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Policy Branch, Agriculture Canada

From a Canadian perspective, the livestock and red meats industry and to a lesser extent the poultry industry has been a North American market since the end of World War II. It is a natural extension then, that Mexico should become a more integrated part of this market. Consumption, production and trade within North America should increase as a result of the North American Free Trade Agreements, to the prosperity of all three trading partners. In this presentation, I first want to tell you why, we as Canadians, have always considered this a North American market. Then, I will present the Canadian medium term livestock and poultry prospects. And, finally, a few comments relevant to the future of the North American market.

THE NORTH AMERICAN MARKET

To a Canadian livestock producer or meat packer, price tells it all. Slaughter hogs, slaughter cattle, feeder cattle, and slaughter lamb prices in Canada are all directly related to U.S. prices. On an equivalent basis, hog, slaughter cattle and feeder cattle prices in Canada are currently below U.S. prices, reflecting our export basis. Slaughter cattle and slaughter lambs in eastern Canada, which are represented by the Toronto prices, are nearly always above the U.S. price which is an import basis. These price linkages have become stronger as tariffs decline due to the Canada/U.S. free trade agreement. The price spread reflects exchange rates, transportation costs, domestic supply and surplus positions, and other marketing charges. Let's look at some of the reasons underlying this price relationship.

Canadian consumption of beef and veal, pork, poultry and lamb will be about 2.6 million metric tonnes (Mt) (5.8 billion lbs) this year, a record large volume. In the U.S., meat consumption will be over 30 Mt (67 billion lbs.) about 10 times greater than in Canada. It is also a record high. Beef and veal accounted for about 40% of Canadian consumption followed by poultry and pork, at about 30% each, lamb represented less than 1%. The U.S. beef and poultry each account for about 37% of the total meat consumption.

Changes in recent meat consumption patterns have been similar in both Canada and the U.S. In both countries, declines in beef consumption have been more than offset by increases in poultry and pork over the past decade. Surprisingly, meat consumption has reached record high levels in both countries this year despite the recessionary pressures. The most remarkable difference is the sharper increase in poultry consumption in the U.S. than in Canada. This reflects, in part, the a more prominent place of the food service sector and the wider range of processed meat products in the U.S. than in Canada, as well as relative meat pricing, and merchandising practices.

Canadian meat production is based upon a world class feed grain industry. In 1991, barley was the major feed grain consumed followed by corn. Cattle, both beef and dairy, account for about 51% of the grain consumption followed by hogs with another 34%. The major consuming regions in Canada are in the prairies followed by Ontario and Quebec. Total grain consumption was 16.5 million metric tonnes in 1991. Similarly, in the U.S. meat production is based upon world priced feed grains, the difference being that corn represents the major feed grain used in U.S. livestock production.

Canada is both a large importer and exporter of meats (excluding poultry) when trade with all countries is considered. About twelve percent of our domestic consumption was imported while about 28% of production was exported, in 1991. Imports accounted for about 20% of the beef market, 60% of the lamb, 10% of the poultry, and 2% of the pork. At the same time, about 12% of Canada's commercial beef production and 30% of pork production are exported. Over 70% of this trade is within North America.

Dressed meat products are traded and differentiated based upon regional demand and supply conditions. Frozen beef is imported into Canada from Oceania primarily for manufacturing, deli preparation and institutional trade. Imports from the U.S. traditionally have been higher valued table ready beef mostly for the hotel, restaurant and institutional trade. This volume has grown significantly over the last few years. Canada's exports of both beef and pork is mostly fresh to the U.S. with higher valued product, particularly pork, being shipped to Japan. Product differentiation will become a key feature of our markets as trade barriers continue to come down.

The interdependence of the livestock sector in North America is increasing. Canadian exports of livestock in 1992 will amount to about 1.7 million head (cattle and hogs) valued at \$1.0 billion, primarily from western Canada. Imports of livestock are limited by animal health regulations. Progress has been made over the past several years to facilitate importation of feeder cattle from areas in the U.S. which meet certain animal health criteria. Slaughter cattle move freely both ways across the border. Work is also underway to permit import of slaughter hogs. Progress in these areas also expands the market from which packers both Canadian and U.S., can source supplies and livestock producers can source and sell animals.

MEDIUM TERM MARKET PERSPECTIVES

The Canadian economy is forecast by the Conference Board of Canada to increase by 3.5 % annually over the next few years. This relatively strong growth will enhance current demand conditions. Population growth is expected to be slow at about 1% or less per year. On the supply side, the relatively low expected interest rates and expected abundant feed grain supplies should moderate costs and allow for consolidation and capital investment to occur in the industry. A lower Canadian dollar compared to the U.S. dollar will tend to support exports and domestic prices. A strengthening Canadian dollar from 1986 till 1991, lowered the value of Canadian livestock. The current depreciation of the dollar directly strengthens the Canadian livestock prices.

BEEF

Total cattle inventories on July 1, 1992 were 12.9 million head with the dairy herd representing 3 million head. Canadian and U.S. beef cattle cycles have tended to move together over the past thirty years. However, the build up in Canadian inventories since 1987 shows a much lower annual rate of increase than compared to the past periods of expansion. Sharp declines in feed costs, higher slaughter cattle prices, pressured feeder cattle prices upward in 1986, particularly in western Canada. The annual rate of growth in Canada's cattle inventory in recent years has been comparatively larger than in the U.S. The beef cattle herd is expected to continue to expand modestly until the mid to late 1990's. Virtually, all of the current expansion in Canada's cattle inventories has occurred in western Canada. Dairy herd is also declining as productivity per cow is increasing partly offsetting the increases in the beef cattle supplies.

Canadian beef production is expected to continue to expand in line with inventory expansion. Total 1993 beef production is forecast to be close to 900 kt, 2% greater than this year. Around a million head of cattle are expected to be exported in 1993 resulting in total farm marketings at just under 4 million head. Slaughter cattle prices in Ontario (the demand centre) are expected to average at or just below this years average price of \$86.00/cwt. Increasing supplies over the next five years, together with large competing supplies of other meats are expected to temper price increases in the cattle markets.

In the 1990's the Canadian pattern of trade has become increasingly integrated in the North American market. In the late 1980's feeder cattle exports to the U.S. increased dramatically, reflecting short supplies in the U.S., a lower Canadian dollar compared to the U.S. dollar and proximity of Canadian feeder supplies to U.S. feeder cattle demand centres. Live cattle exports both for slaughter and feeding have continued large in the early nineties.

As Canadian cattle exports to U.S. increased, beef imports from the U.S. into the eastern Canadian market have also increased. Eighty-six thousand tonnes of beef were imported from the U.S. in 1991 representing Canada's largest source of beef imports. This is in sharp contrast to the early 1980's when Oceania accounted for 90% of Canada's 50 kt imports. Canada's

imports of dressed beef from the US have quadrupled; from about 20 kt (43.5 mil. lbs) in 1985 to about 80 kt. (176 mil. lbs) in 1992. Total imports of dressed beef will be close to 160 kt. U.S. now accounts for about 50% of the volume of imports and about two-thirds of the value of the imports. Canada's beef and veal exports, if continuing at the current rate, will reach over 130 kt., primarily with the U.S.

PORK

Total hog inventories on July 1, 1992 were 10 million head producing an expected slaughter of about 15 million head for the year. This represents a 5% increase in pork production compared to the year earlier reflecting expanded inventories. Canada's grading and marketing efficiencies have resulted in more lean meat produced per carcass. Lean meat yields have increased approximately 5 kgs. since 1980. This reflects an increase in the national average index from 102 in 1980 to 105 in 1991 along with an increase in average cold carcass weights of 77 kg. to 80 kg.

The Canadian and U.S. hog cycle continue to follow similar patterns. The Canadian hog cycle has become less variable in the past 10 years reflecting the fewer but larger specialized farms that currently characterize the industry. In 1981, the average-sized farm had 177 market hogs, which increased to 345 hogs by the time the 1991 Census of Agriculture was taken. As a matter of fact, the average farm size in one major hog producing region, Quebec, is over 840 head per farm. The number of hog producers had declined from 55.7 thousand in 1981 to 29.6 thousand in 1991.

The industry shift has been toward more capital-intensive hog production units. Today, the industry is virtually 100% confinement rearing. This has resulted in more stable rates of expansion and contraction compared to earlier cycles. In fact, total assets per farm were estimated for 1989 to be higher in Canada than in the U.S. reflecting the greater investment in Canada in land and buildings.¹

Hog inventories are expected to decline in 1993 following a period of unfavourable hog enterprise returns since late 1991. Lower feed grain prices in 1993 should encourage expansion particularly in western Canada followed by increasing inventories in 1994/95. In Canada, lower pork output in 1993 compared to 1992 maybe in contrast to continued large US supplies. Canadian slaughter hog prices on an equivalent basis are below the U.S. market prices. Canadian hog prices are, in fact, the lowest in the world. The wider average spread between Canadian and U.S. hog prices during the mid 1980's reflects the countervailing (CVD) duties U.S. imposed on Canadian hogs and pork. The CVD on pork was subsequently overturned, and the Canadian price has moved closer to traditional relationships. Index 100 hog prices are

¹This and other financial information was compiled from the Farm Credit Corporation Survey in Canada and the Farm Costs and Returns Survey in the US.

expected to average at or slightly above this years average price of \$130/kg reflecting a narrowing of the price spread following the reduction of U.S. CVD.

Canadian exports of pork have reached a new plateau in the 1990's. Most of the exports stay within North America with U.S. as the major destination. Exports to Japan have also increased. Canada has a positive net trade position in pork and slaughter hogs.

POULTRY

The Canadian chicken and turkey industry has been close to self-sufficient over the past 15 years reflecting the supply management policy of the Canadian industry supported by the federal and provincial governments. Demand for poultry meat in the late eighties increased more rapidly than anticipated, resulting in a shortfall in domestic supplies. Imports increased accounting for about 10% of domestic disappearance in 1991.

Expectations for some recovery in the Canadian economy should bolster the food-service sector, which is an important component of Canada's demand for chicken. Both chicken and turkey demand are forecast to continue increasing over the medium term, but at a more modest pace than was seen in the late 1980's. Domestic disappearance is forecast to increase more than 10% over the 1992-1997 period. Despite this expected increase in chicken consumption, per capita levels are still well below those realized in the U.S. Expectations for large total meat supplies over the medium term will temper price increases in the poultry sector.

NAFTA

Clearly, one of the major challenges of the North American red meat and poultry markets during the next five to ten years will be the effective marketing of meats with Mexico in the emerging North American markets. Currently, Canada's trade with Mexico is largely complementary with imports being off-season fruits and vegetables and exports being grains, oilseeds, meat and livestock. The phasing out of tariffs and opening up of the Mexican economy is expected to result in greater growth in Mexican disposable incomes. This should be reflected in increased demand for imported products, in particular livestock and meat, especially pork.

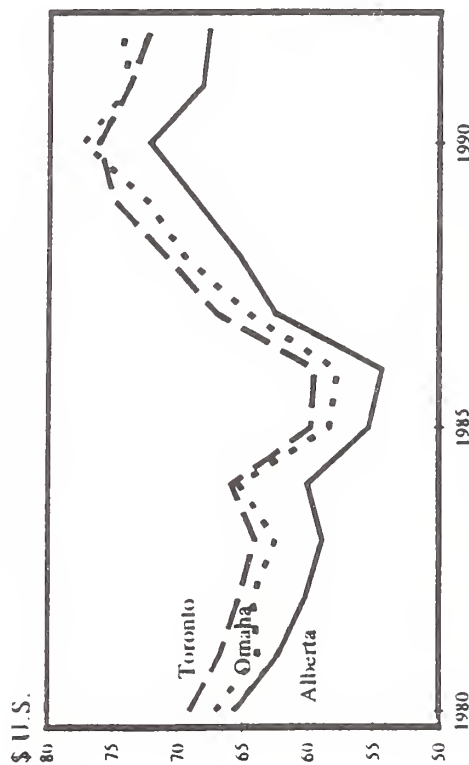
A comparison of Mexican per capita consumption with Canada, and the U.S. or even compared to previous consumption levels suggests that there is a good potential for increased consumption of meats. Canada and U.S. total meat consumption is over 100 lbs per capita greater than Mexico. Mexican pork consumption in 1983 was 22 lbs higher than in 1989.

As our meat and livestock economies become more interdependent there will become increasing need for good trade rules and regulations that are adhered to at all levels. However, governments will have to use restraint in using their tools to create barriers which satisfy political whims rather than any real injury justification. If the North American economy grows

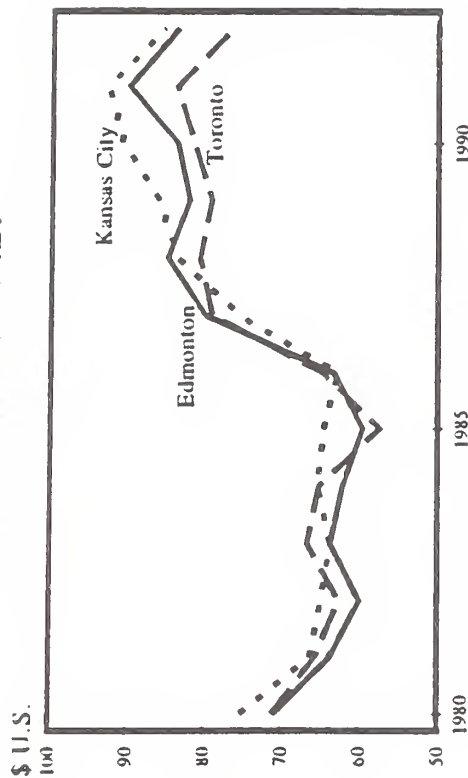
as expected over the next decade with strong growth emanating from Mexico then North American trade will increase in volume and value.

Canada's contribution will be highly complementary to its NAFTA trading partners. The red meats and poultry industry in Canada is focused on a small population base, has developed unique products, and built an infrastructure to achieve high levels of consumption on a broad geographical base. This will be part of its strength in future trade within North America. We are already operating in a North American market. We are becoming even more interdependent as barriers decline.

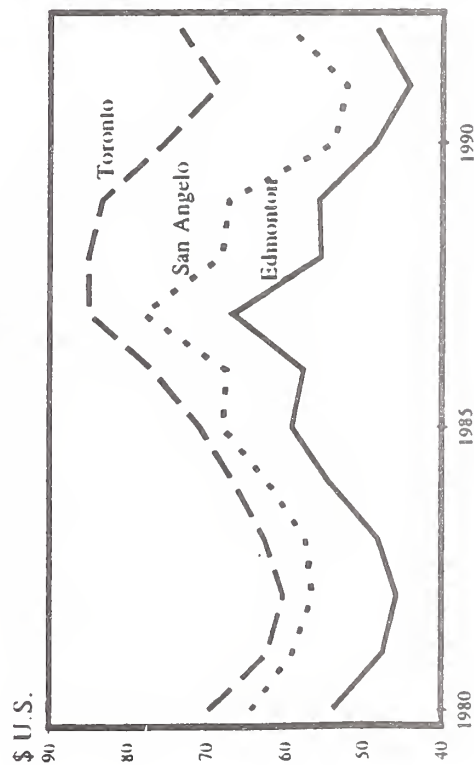
**SLAUGHTER STEER PRICES
CANADA AND U.S.**



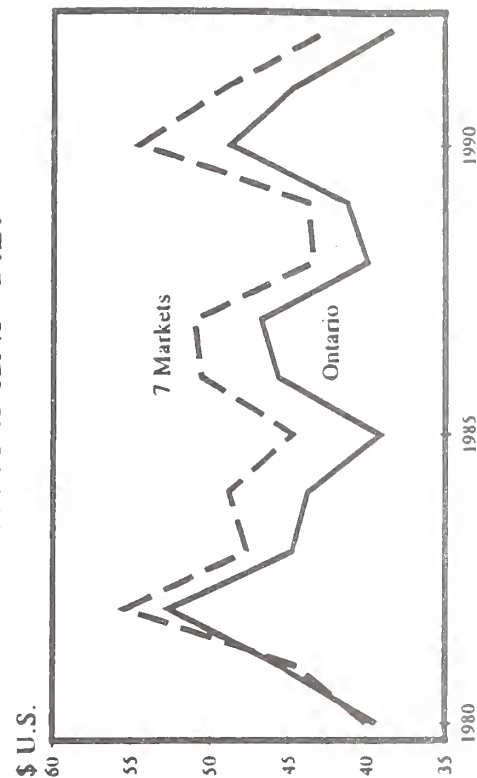
**FEEDER STEER PRICES
CANADA AND U.S.**



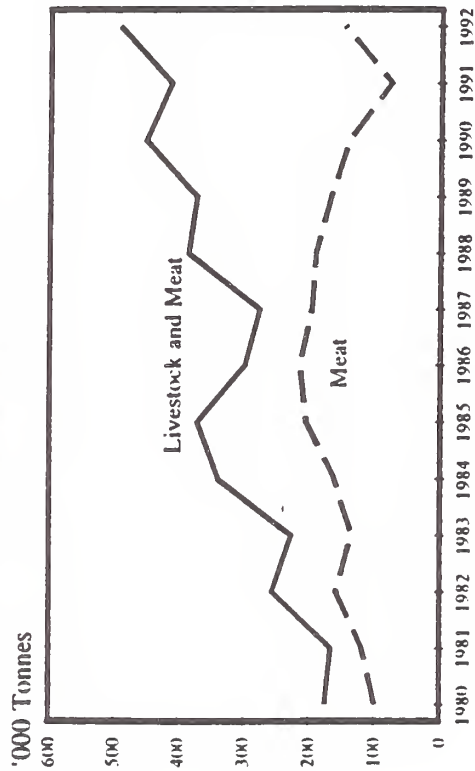
**LAMB PRICES
CANADA AND U.S.**



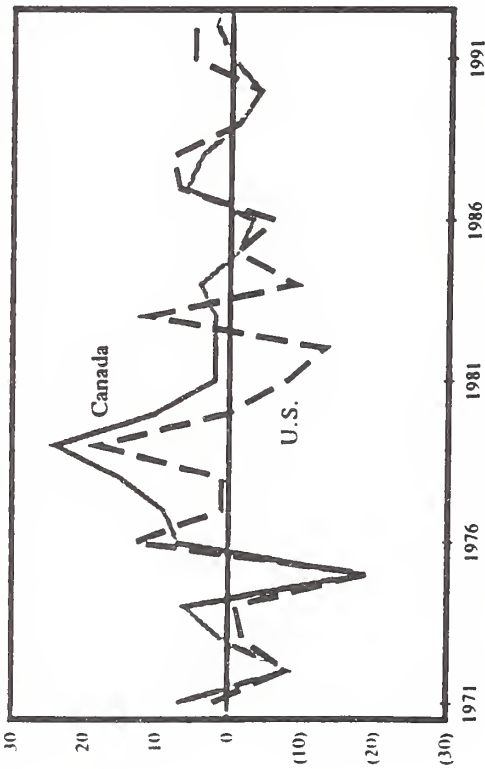
**HOG PRICES
CANADA AND U.S.**



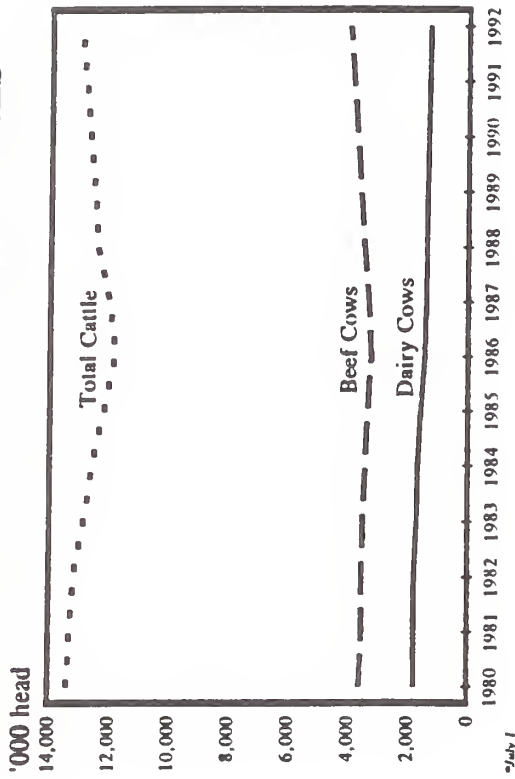
CANADA'S NET TRADE POSITION Livestock and Meat



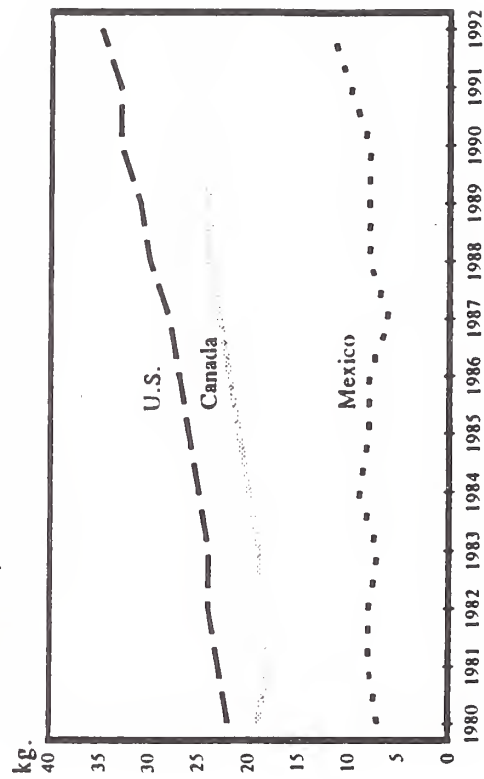
HOOG CYCLE - CANADA AND U.S. 1971-1992 PERCENT CHANGE YEAR EARLIER



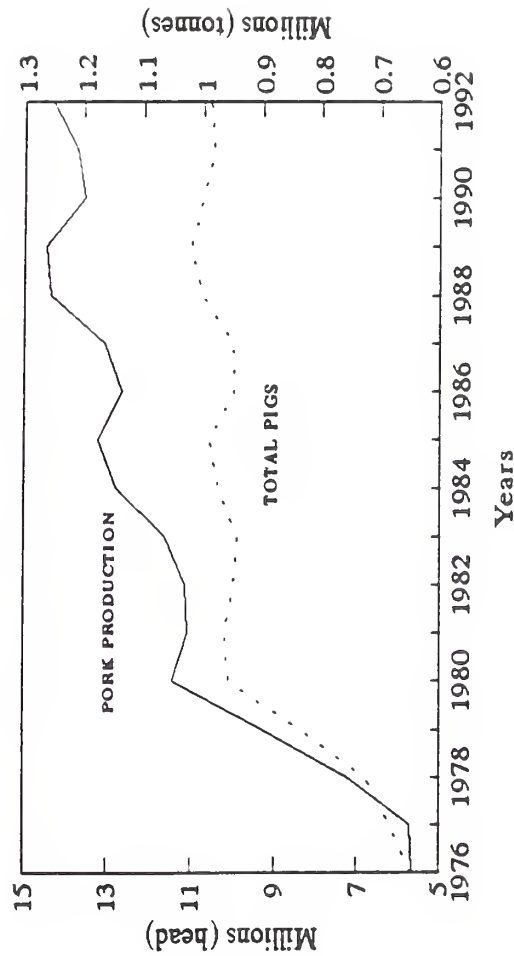
CANADIAN CATTLE INVENTORIES*



PER CAPITA CONSUMPTION OF POULTRY CANADA, U.S. AND MEXICO - 1980-1992

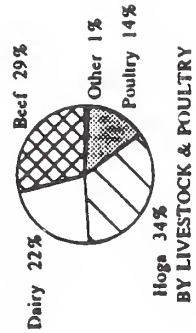
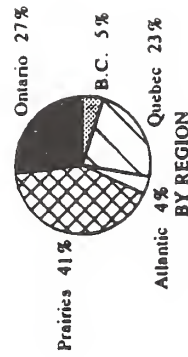
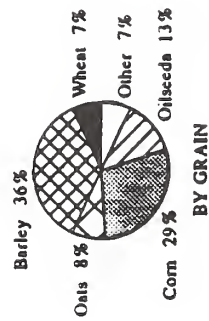


TOTAL HOG INVENTORY AND PORK PRODUCTION



FEED GRAIN CONSUMPTION, 1991

16.5 mt

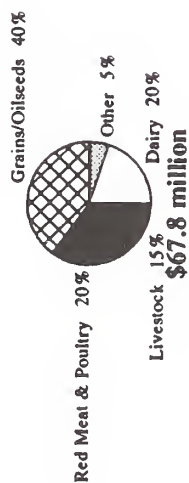


Source: Statistics Canada, Feed Grain Utilization Study, October, 1991

CANADA'S FOOD AND BEVERAGE TRADE WITH MEXICO - 1991

(\$ million)

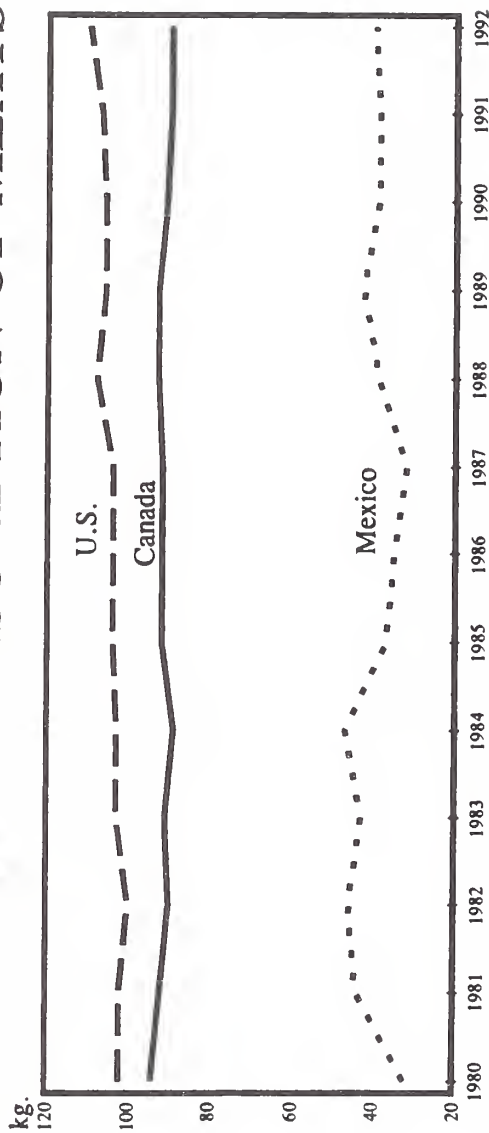
EXPORTS



IMPORTS

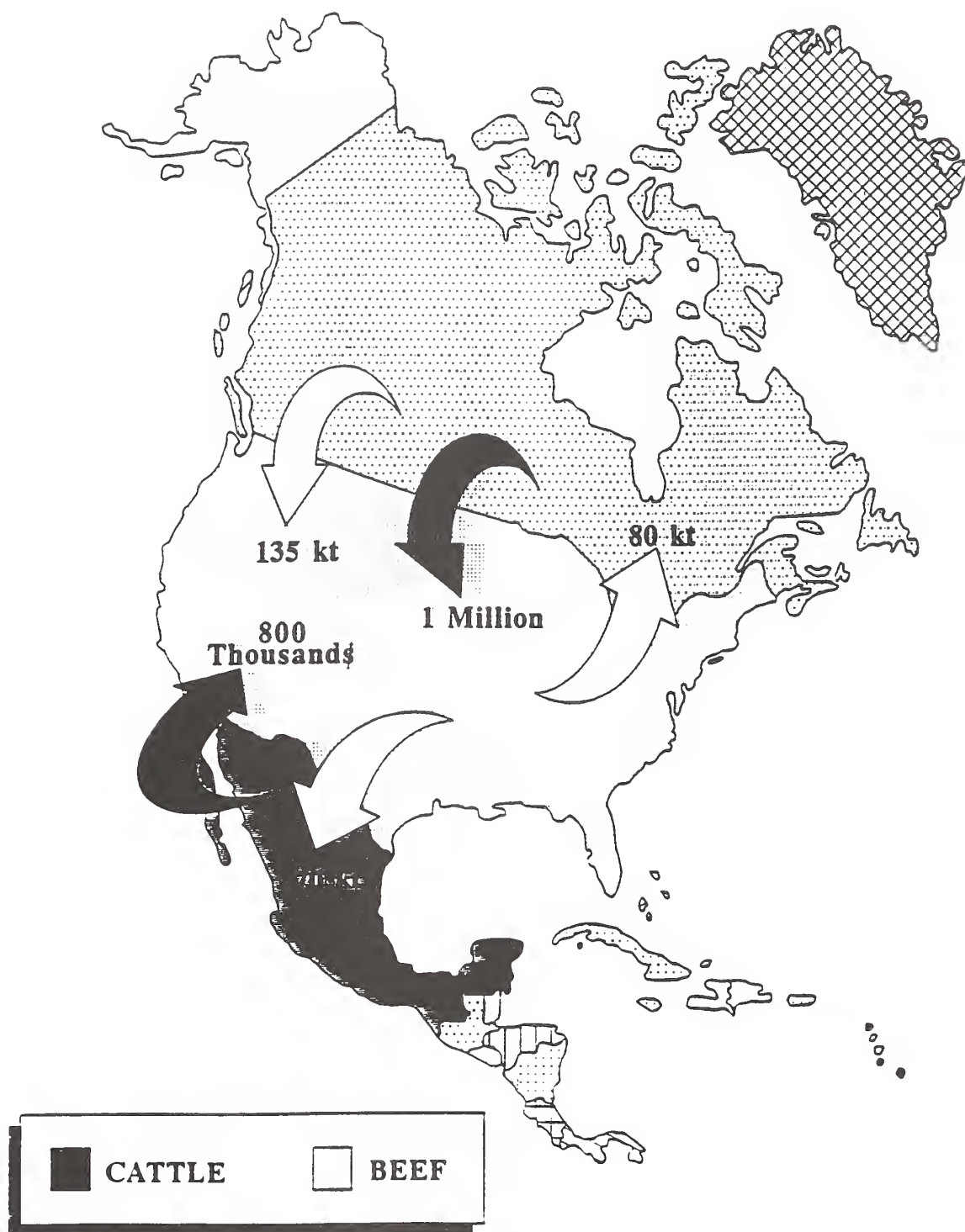


PER CAPITA CONSUMPTION OF MEATS*

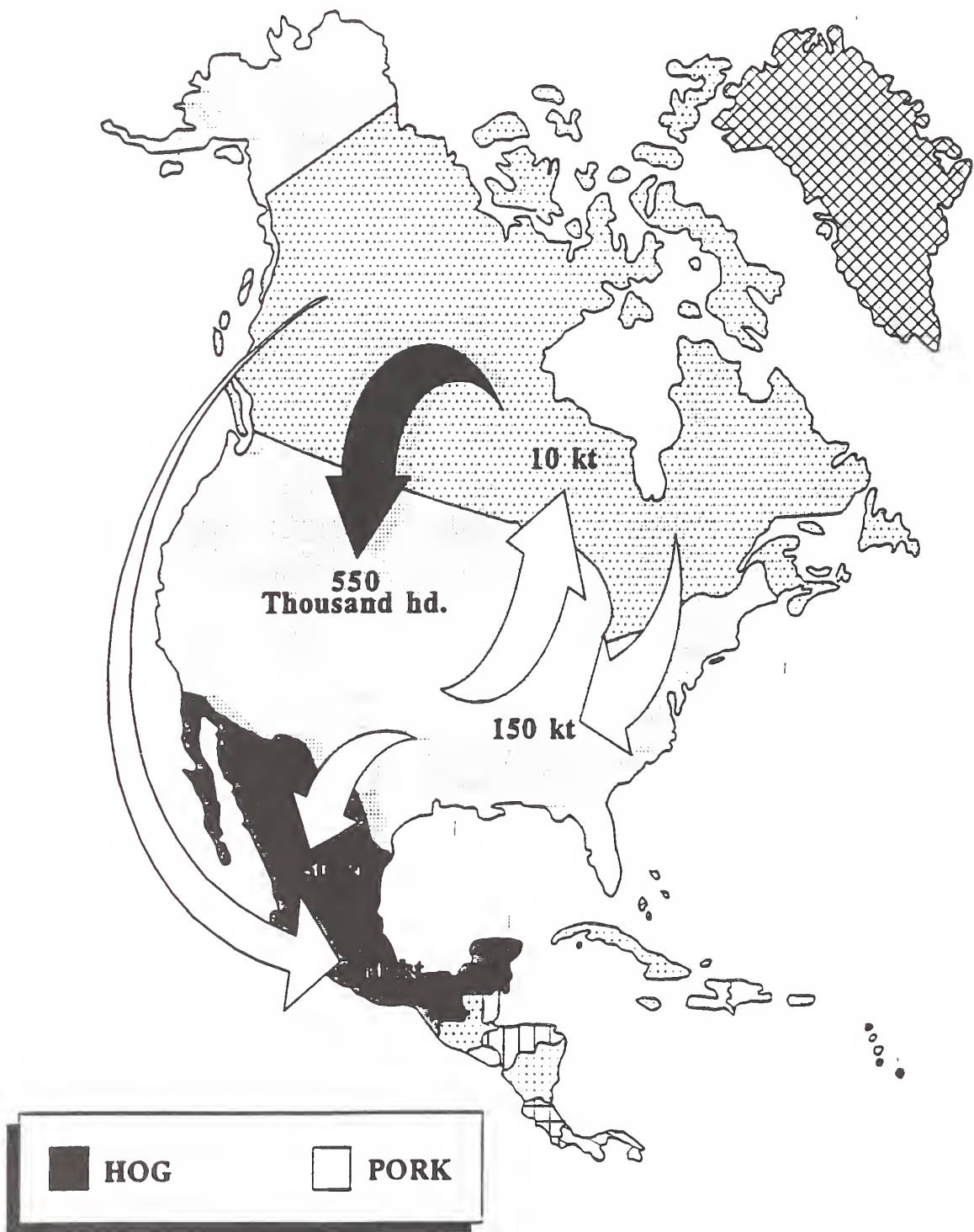


Includes Beef, Pork, Poultry

NORTH AMERICAN BEEF TRADE FLOWS 1992



NORTH AMERICAN PORK TRADE FLOWS 1992



Outlook '93

For Release: Wednesday , December 2, 1992

U.S. RED MEAT AND POULTRY OUTLOOK AND NORTH AMERICAN TRADE ISSUES

Alejandro Silva
Vice President Marketing
Cargill Foods S.A. de C.V.
Mexico City

On November 11 th 1992, President Salinas published in the Mexican Federal Rergister a decree by which new tariffs on Red Meats and Live cattle were imposed.

The following changes became effective November 12.

Tariff No	Product	Tariff Old	Tariff New
0102.90.3	Live Cattle	0%	15%
0102.90.99	Live Cattle	0%	15%
0201.10.01	Carcasses Fresh	0%	20%
0201.10.01	All Fresh meat Bone In	0%	20%
0201.30.01	All Frozen Meat Boneless	0%	25%
0202.10.01	Frozen Carcasses	0%	25%
0202.20.99	Frozen Bone in Meat	0%	25%

The above Changes were implemented, according to the Federal Register, for the following reasons.

Imports of live cattle and meat have increased substantially during the period of **January 1989 to July 1992 showing a growth of 513% in Volume and 718% in value.**

National Production has diminished its participation in the Mexican Market. Imported Meat has increased its participation from **3.2% in 1989 to 16% in the first semester of 1992.**

Due to the above the feeding Cattle Industry has **decreased 52 % from 1989 to 1992 and plant slaughter utilization this year will be only 35%.**

The significant growth of imports of Livestock and Meats, specially during the last three months in conjunction with low international prices have put a significant pressure to domestic prices and have **harmed domestic production.**

Prices to the farmers for livestock have dropped in real terms from **January 1970 to September 1992 by 37.3%.**

This fall of Internal prices and non tariff protection **has caused a reduction in the profitability of the Industry and subsequent Under capitalization.**

The immediate effect of the new tariffs was a drastic reduction of meat Imports for as much as 80%. Meanwhile Importers figure out the **Strategies that will follow in the future.**

In order for you to have a better **understanding** of the **Mexican Market.** I would like to give you some basic facts:

Population in Mexico is around 90 million people, with a GNP per Capita of 2700 Dollars/Year and a GDP growth (1991) of 3.6%.

Import of Beef and Veal from the USA in 1991 soared to 130% on value over 1990 to 185 Million Dollars and we Expect a growth from 1992 over 1991 of other 27% to a value of 235 Million dollars.

Imports in Volume was in 1991, 89,154 Metric Tons. of which 64,191 came from the USA the rest from EEC, Australia and C. America.

Projected Imports for 1992 are estimated at 101,925 metric tons. of which 81,540 are from the USA.

Mexico domestic production is estimated at an annual slaughter of **6,000,000 head of cattle per year.** Total consumption is estimated at 1.92 million metric tons giving us a per capita consumption of 49 lbs/year.

Mexico is divided into two distinctive production and marketing areas:

Northern States: Sonora, Baja California, Chihuahua, Durango, Coahuila, part of Tamaulipas and Zacatecas and **Rest of the Country.**

This division was implemented in 1947 as a result of foot and mouth

outbreaks where Mexico was banned of exporting live cattle.

Processing plants were built to process canned beef starting the development of the organized Meat industry in Mexico.

Mexico eradicated foot and mouth disease at the end of 1954 even though strict sanitary measures were maintained within North and Southern states.

Northern states were allowed to export live cattle and the South was banned. This fact developed the beef and cattle industry into two distinctive markets: **One focused to export live cattle (north) and the other one for domestic use (south).**

In January 1950 Mexico publishes its Regulation and Industrialization law of meat products and initiates trade with United States, basically exporting boneless frozen meat, also establishing the first TIF (Federal Inspected Plants) USDA equivalent. **This plants were concentrated in the Northern States.**

Presently Mexico has in place a federal inspection system equal to USDA and approved for export to the USA.

TIF plants have increased from 1989 to 1992 from 44 plant in 1989 to 82 plants in 1992 an increase of 86 %. This plants include chicken, industrial plants and slaughter houses of these plants 10 of them are authorized for export to the USA.

There are 36 TIF slaughter plants with a yearly capacity of 2.2 million heads per year, the present slaughter of these plants is 870,000 heads per year representing 15 % of the total Mexican slaughter.

The largest TIF plant is located in the state of Tabasco and supply carcasses to Mexico City, currently slaughtering 220,000 head per year, followed by 4 plants in the State of Nuevo Leon with a present slaughter of 150,000 head per year.

Feedlot concentration is also in the Northern States.

Northern States market grain fed cattle:

Central and Southern States market grass fed cattle.

Mexican industry sources say that mexican beef production has been declining since 1980 and that mexican cattle inventory now number **around 22 million despite higher governments estimates.**

Farmers of the north produce steers for export to the USA and heifers are sold to Domestic feedlots.

Farmers of the south have a year round production of grass fed cattle most of it Market Domestically.

All farmers market their product in carcasses with minor production of box beef, **85 % of this cattle is slaughtered in municipal slaughter houses with very low hygienic condition.**

Supermarkets represent 25 % of the sales of meat with the remaining 75 % sold to butcher shops and public markets.

Mexican consumers of the central and south of Mexico, **only consume boneless beef of which the great majority is sold in the form of very thinly sliced steaks.**

Northern states represent the only market for bone in products and is the only area outside of high class restaurants and Resorts that uses middle cuts similar to the USA.

Imports of beef in Mexico have increased by the following facts:

Imported meat comes in boxes and its been complemental to carcass sales, demand is in boneless round cuts representing additional sales and ease of handling of the product.

Price has been competitive with Mexican prices.

Opening of the Mexican market and growth of the Mexican economy.

Distribution of the boxes is been easier than carcass distribution.

It is important to understand and analyze the products that are **being sold in the Mexican market** in order to forecast the impact that duties may have in sales of imported meat into Mexico and help development of strategies for American Exporters.

What are the products being exported to Mexico ?

60 % of the meat going into Mexico are round cuts, insides, knuckles and goosenecks.

15 % are chucks. Bone in/boneless

15 % carcass basically misfits. Lights, dark cutters, etc.

5 % Middle cuts

4 % Inside skirts

In order to meet the demand of round cuts Mexico will need to slaughter 1.3 million cattle a year to satisfy the Mexican demand, This will represent an increase of the Mexican slaughter of 20 %.

We can conclude that Mexico is deficitary in meat production and in the near future won't be able to satisfy the domestic demand and will have to continue importing beef.

The two economies USA and Mexico are complementary, Mexico needs the round cuts and the USA could use the middle cuts, and the Mexican light steers.

In order for Mexico and USA to have a Win-Win scenario Mexico has to develop its livestock industry to produce more fat cattle of which it will use the end cuts an offal and develop a market for export of the middle cuts. This will require USA to accept USDA grading in Mexico.

Australia will continue its efforts to market round cuts into Mexico and its been gaining some market, the same is true for Central America countries (Nicaragua, Honduras, Panama y Costa Rica).

CONCLUSIONS

The Mexican Government has agreed with the Mexican Cattlemen Association that retail prices of meat won't increase.

Mexico has ceiling prices on the end cuts in most of the States with the exception of Nuevo Leon and Sonora and they will be strictly enforced.

President Salinas has announced his 1993 Economic plan where he is projecting single digit inflation, increases in meat prices won't be allowed.

Approval of NAFTA by Congress will assure a growth in the Mexican Economy and US Meat Industry will be greatly benefited.

We expect prices of Mexican carcasses to go up cyclicly by the end of January, this will create inflationary pressures that may push the government to review its tariff policy.

Because of the importance of the volume of round cuts, some international prices may go down in order to continue the supply in Mexico.

Our forecast is that 1993 volume of imports in Mexico may drop as much as 30 % to levels of 165 million dollars per Year.

Mexican Government is sending to Congress during the current Session an Initiative of Animal Health which contemplate official norms by which they will require all Municipal Slaughterhouses to Upgrade their facilities to TIF standards, Municipal Abattoir Slaughter 85 % of cattle in Mexico. These changes should create new opportunities for US Beef.

As December 1 all Live Cattle from the States will have to be Slaughter in any of the 37 TIF plants, this measure and duties should reduce trade of Live Cattle.

Great concern exists in Mexico about the Resolution by which quarantine of Mexican Cattle will take place in the USA for the Tuberculosis program. Fears are that a great number of exporters will not be motivated of Export.

The Mexican Government has decided to support the Mexican Livestock Industry and help it in its development.

The unknown is how Mexico will handle it's trade deficit and how the new Democratic Government of the USA will deal with NAFTA

Outlook '93

For Release: Wednesday, December 2, 1992

1993 OUTLOOK FOR U.S. FRUIT AND TREE NUTS

Dennis A. Shields
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Good afternoon and welcome to the fruit and vegetable outlook session. I would like to first focus on the situation and outlook for fruit and tree nuts, then briefly highlight demand trends and what they mean for the U.S. fruit industry.

Larger citrus crops and apple supplies will likely dampen prices in first-half 1993 from a year earlier. If Florida and California pass through the winter without significant freeze damage, citrus supplies will be plentiful during 1993. Higher apple stocks will also likely moderate fruit prices. Chilean fruit production is expected to increase from last season, likely boosting fruit exports to the United States. Before I go into detail about the fruit outlook, let's first consider the tree nut supply and outlook for 1993.

Generally Tighter Tree Nut Supplies In 1992/93

Total tree nut supply in 1992/93 is down about 8 percent because of low beginning stocks for almonds and smaller crops of walnuts and pecans. Per capita tree nut consumption in 1992/93 will likely decline from 1991/92's record 2.51 pounds.

Almond production in 1992 was up 12 percent from a year earlier, but the lowest beginning stocks since 1987/88 reduced the U.S. almond supply to a 6-year low. Tighter supplies are expected to strengthen grower prices in 1993. The 1993/94 crop could be smaller because of the alternate bearing characteristic of almond trees, but the moderately large 1992/93 crop should minimize tree stress. Nevertheless, ending stocks could be low next June, further tightening 1993/94 supplies.

Lower production and normal beginning stocks have reduced the U.S. walnut supply in 1992/93. Reduced supplies and continued strong domestic and export demand may push the season-average grower price to a record high in 1992/93.

Pecan production in 1992/93 is down one-third from a year earlier. The alternate bearing characteristic of pecan trees and a variety of weather and pest problems contributed to lower 1992 production in most States. Smaller U.S. supplies will likely maintain the season-average grower price near last year's level. Mexico is expecting a larger crop and will likely increase pecan exports to the United States, partially dampening the effect of the smaller U.S. crop.

Unlike the other tree nuts, the 1992 pistachio and hazelnut crops are larger than last year. Assuming strong domestic and export demand in the coming year, ending stocks of pistachios in August 1993 are expected to be near the low level of August 1992. A small 1993 crop, due to the alternate bearing characteristic of pistachio trees, and low stocks could push 1993/94 supplies to a very low level. Record large hazelnut production and larger supplies are expected to pressure grower prices.

Whereas the U.S. has a rather tight tree nut supply, fruit production and supplies are expected to be more plentiful during at least the first half of 1993. Let's begin with citrus.

Citrus Production Up in 1992/93

The fresh orange supply is expected to rise in 1992/93. The California navel crop is expected to be up 8 percent, while the Valencia crop is expected to be down 3 percent from the near-record 1991/92 harvest, leaving total California orange production up 3 percent. In the absence of weather-related production losses, ample supplies will likely put downward pressure on grower and retail prices. The threat of freeze damage makes December and January critical months for the citrus industry in both California and Florida.

World orange juice production is expected to rise significantly in 1992/93 as Florida's orange crop is forecast up 33 percent and Brazil's 1992 orange crop and juice production are forecast up 10 percent. Larger supplies will reduce prices of processing oranges and orange juice. Florida and Brazil produce about 90 percent of the world's orange juice. Retail prices of FCOJ have been declining since May 1992, and, if the Florida crop is realized, should remain below a year earlier in 1993.

The 1992/93 Florida grapefruit crop is expected to be up more than one-fourth from a year earlier, making it the third largest on record. A heavier fruit set resulted in below-average size fruit. Production of seedless and colored grapefruit continues to increase while seedy varieties decline.

Noncitrus Fruit Supplies Should Be Ample Through Next Spring, but Summer Fruit Production Is Uncertain

The 1992 U.S. apple crop was up 4 percent, and fresh apple storage, as of November 1, 1992, was up 14 percent. Production was up in the Western States but down in the Central States. The larger Western crop should provide ample supplies through the spring, keeping a lid on apple prices. Production in the Eastern States was down slightly as smaller crops in Pennsylvania, Virginia, and elsewhere more than offset a larger New York crop.

Export markets in the Far East and Mexico are expected to remain strong in 1993. Larger crops in Canada and Europe will likely reduce exports to those destinations. Because of the larger supplies and lower total projected exports, apple prices are expected to decline in 1992/93 from the record high in 1991/92.

Winter pear production in the Pacific Coast States was up 3 percent in 1992, but down 2 percent from 1990. Grower prices were mixed in 1992 because of strong processor demand early in the season. Fresh-market pear prices have been generally lower this fall. Larger supplies of apples and other fruit in early 1993 will put downward pressure on prices. On October 31, 1992, fresh-market (winter) pear stocks were about the same as a year earlier.

Chile's exports of grapes, pears, peaches, and nectarines are expected to increase in 1993. Freezing weather damaged Chile's 1992 deciduous fruit crop, and U.S. imports were about the same as the year before. Chilean fruit production was up about 1 percent from 1991, but considerably less than the growth expected under normal conditions. Thus, if adverse weather does not affect Chile's fruit crops, larger supplies should be available for export. Also, fruit quality is expected to be better than last year.

California's production of Bartlett pears, nectarines, plums, peaches, apricots, and grapes was larger in 1992 than the previous year. Tree and vine stress resulting from increased output could reduce production in 1993.

Now I would like to take a step back and look at where demand is taking the fruit industry.

Per Capita Consumption of Fresh Fruit Growing

First of all, is fruit consumption growing? We can say that, yes, fresh fruit consumption is climbing. While we see a growing demand for total fresh fruit, gains in noncitrus consumption have more than offset slightly smaller per capita consumption of fresh

citrus. Over the years, freeze damage and growing export markets have reduced citrus supplies available for domestic shipment.

Frozen fruit consumption has increased during the last 10 years as most fruits registered gains, including blueberries and strawberries. Dried fruit consumption, led by raisins, has also increased since the 1970s. Increased apple juice consumption has boosted total fruit juice consumption, while canned fruit consumption dropped about 15 percent from the 1970s to the 1980s.

Expanding Export Markets

During this period of increasing fruit consumption, fresh fruit exports have more than doubled. The value of total fruit exports adjusted for inflation has grown an average of 4 percent per year since 1970.

Exports dipped in the mid-1980s as the dollar strengthened. After 1985, exports grew when the dollar weakened, but a number of other factors also led to greater exports. First, several countries have reduced their trade barriers--countries like Japan, Korea, Thailand, Mexico, Venezuela and others. In developing countries, growing incomes are increasing demand for non-staples. USDA's Market Promotion Program has provided additional investment towards boosting horticultural exports and helped increase awareness overseas of U.S. agricultural products, including fruit.

Exports to Canada and Europe are increasing, while fast growing markets, where the United States has a relatively high share of the import market, are also demanding more U.S. fruit. These countries include Mexico, Venezuela, and countries in southeast Asia.

Exports of wine have increased each year since 1984, partially offsetting lower domestic per capita consumption. The United States has registered gains in most major markets, including Canada, Japan, the United Kingdom, and Mexico.

Foreign markets are taking a bigger share of the U.S. crop than 20 years ago for a number of fruits. Apple exports were 20 percent of the fresh market crop in 1991/92, up from about 3 percent in 1970/71. The orange and grapefruit export share rose from a little more than 10 percent to more than 25 percent, and raisins from less than 30 percent to almost 40.

In 1991/92, growing export demand for U.S. apples and a very short European crop helped to sharply raise grower prices, despite a larger U.S. crop. A strong domestic apple juice market also boosted grower returns. Obviously, export markets are vital to a healthy domestic industry. But growing export markets can

reduce fruit available for the domestic market, raising prices and cutting into domestic consumption.

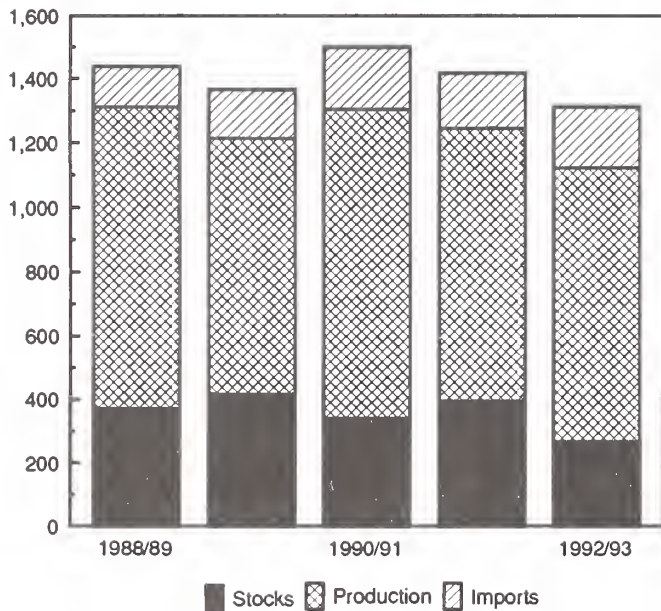
The following are a couple of developments that indicate future production changes that will complement the expected increase in domestic and export demand for U.S. fruit.

- In Florida, citrus acreage has expanded and shifted south, making the industry less susceptible to freeze damage. During the last 2 years, growers added more acres of new trees than in any other 2-year period since the Florida citrus inventory began in 1966. The bearing-age orange tree population is expected to increase almost 50 percent over the next 2-3 years. The larger supply will likely moderate fresh-market orange and juice prices, and, thereby enhance domestic consumption.

- Apple growers in California, Washington, Michigan, Pennsylvania, and other States have planted more acres of Gala, Empire, and Fuji apples. The trees will enter bearing age during the next several years.

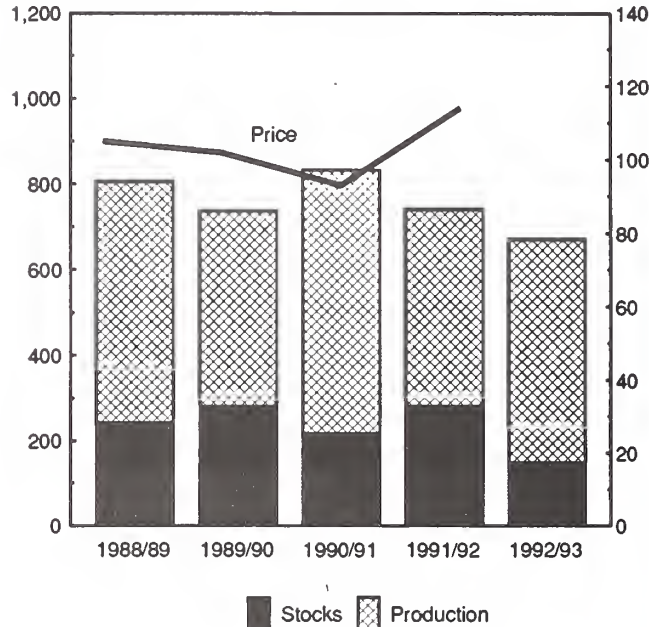
Lower Tree Nut Supplies in 1992/93

Million pounds (shelled)



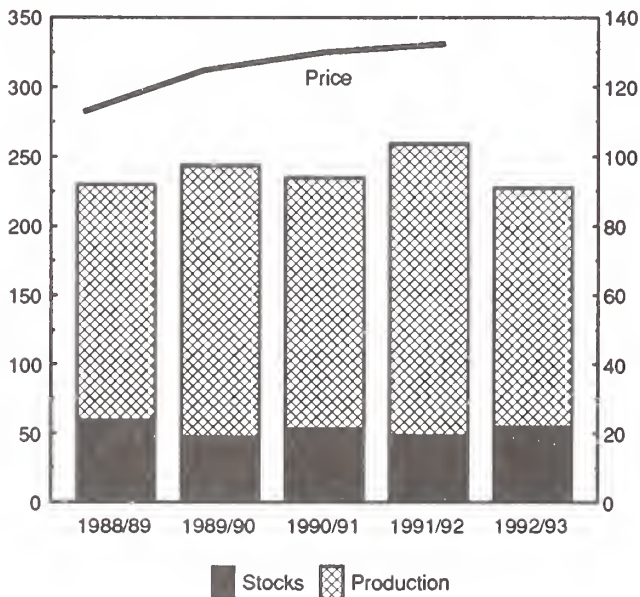
U.S. Almonds Supply Down in 1992/93

Million lbs (shelled)



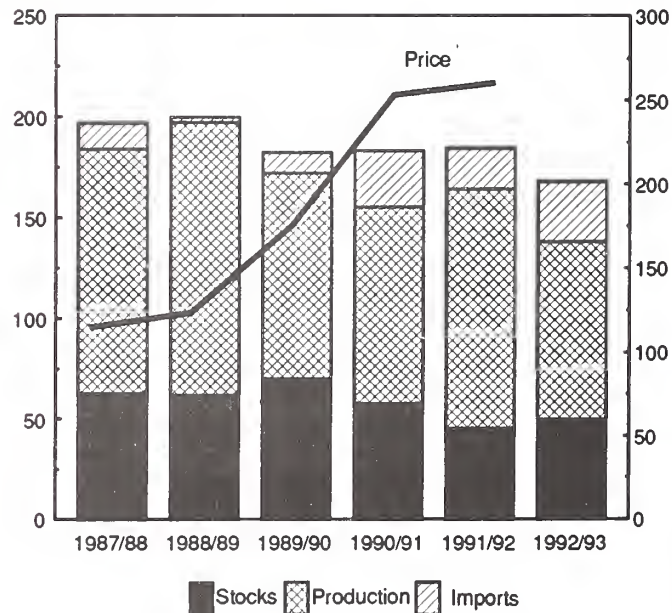
U.S. Walnut Production and Supply Lower

Million lbs (shelled)

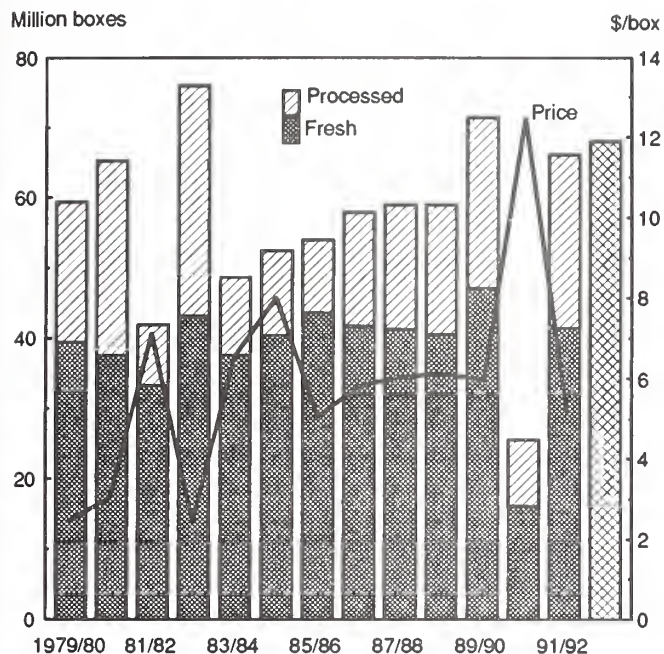


U.S. Pecan Crop Down, Imports Partially Offset

Million lbs (shelled)

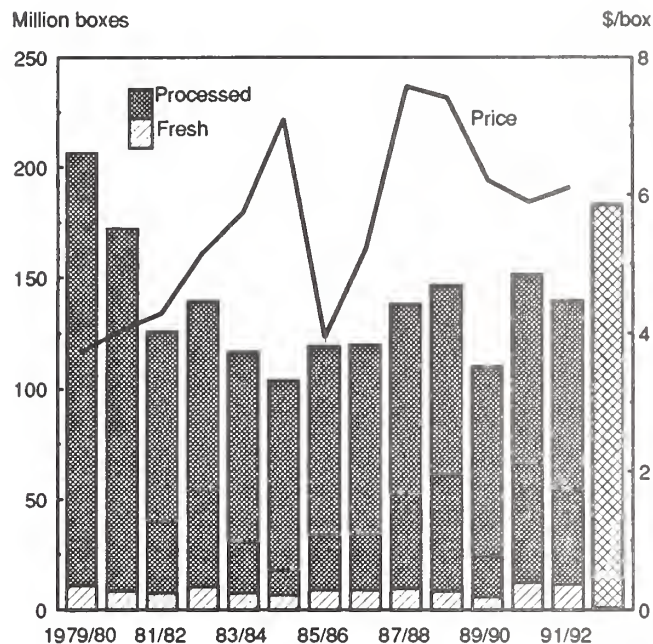


Larger California Orange Crop in 1992/93



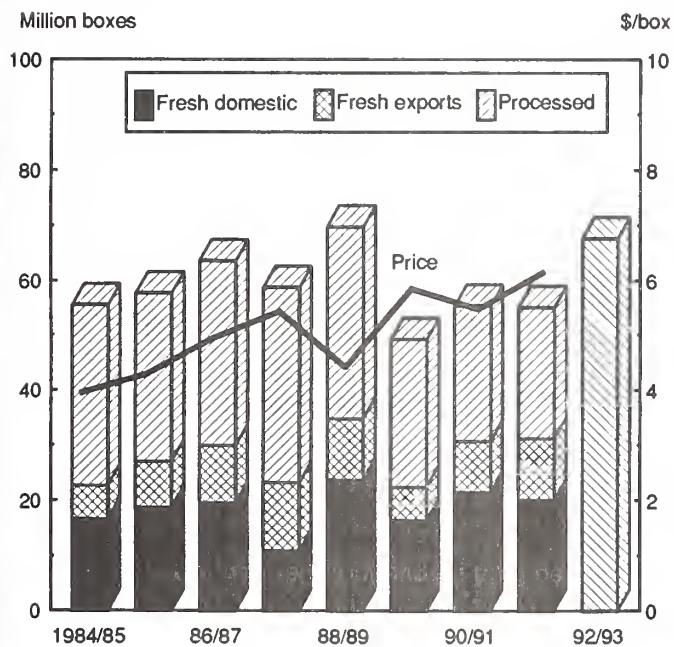
All price = season-average on-tree returns.

Florida Orange Production Up 33 Percent



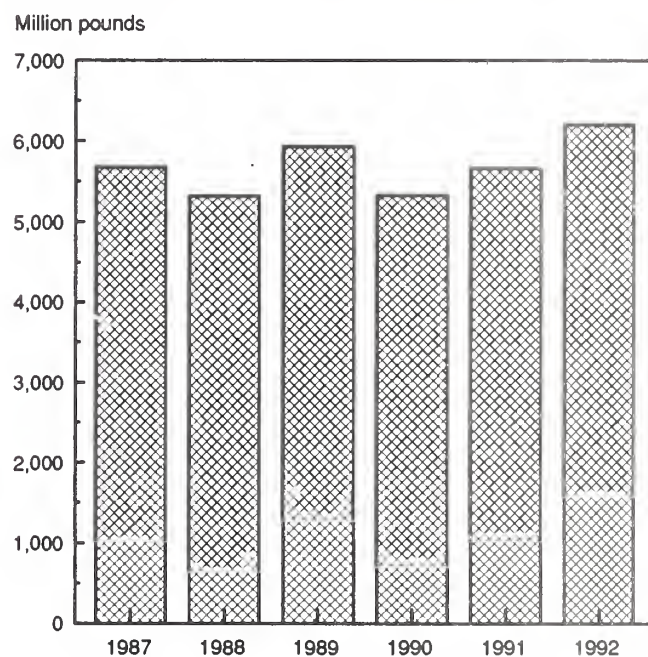
All price = season-average on-tree returns.

U.S. Grapefruit Production Also Up

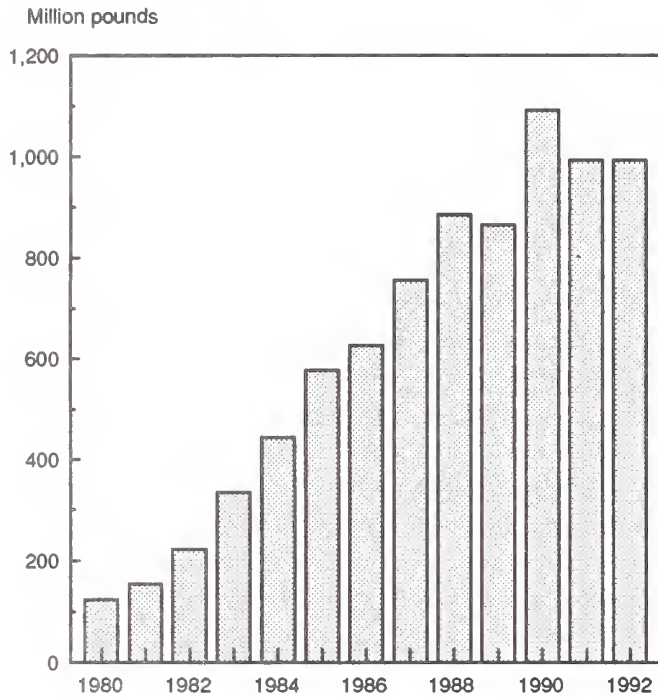


All price = season-average on-tree returns.

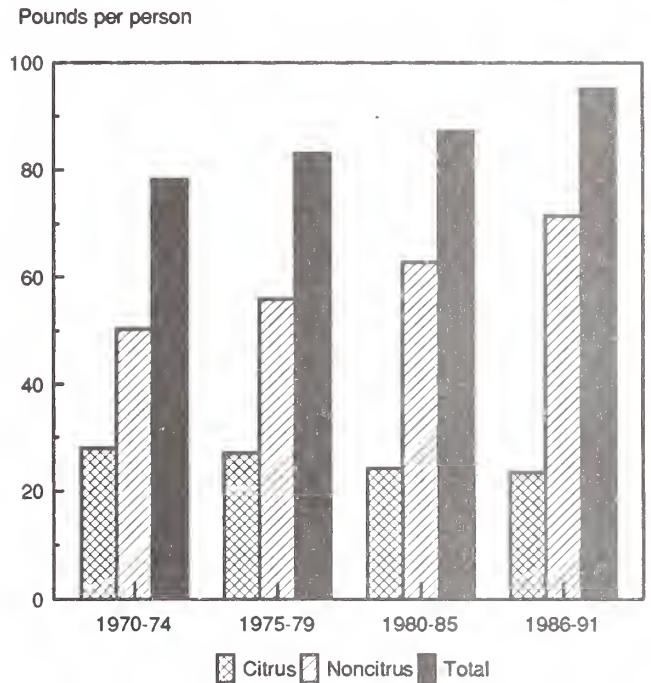
More U.S. Apples In Storage, November 1, 1992



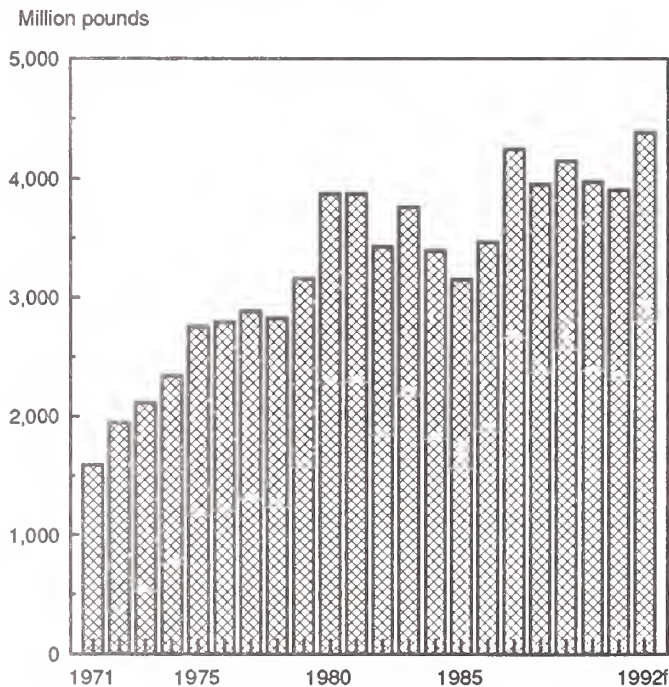
U.S. Fruit Imports From Chile Likely Up in 1993



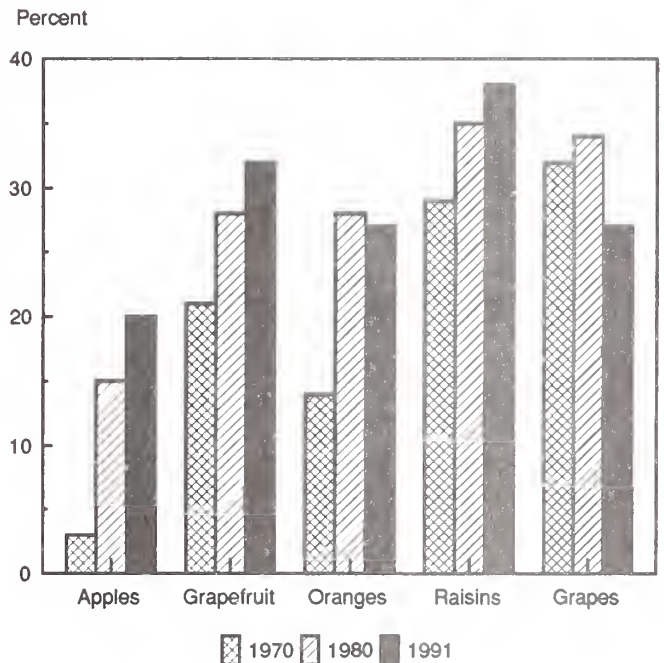
Growing Fresh Fruit Consumption



U.S. Fresh Fruit Exports Rise



Exports Account for Growing Share of U.S. Fruit Production



Outlook '93**For Release: December 2, 1992****U.S. VEGETABLE SITUATION AND OUTLOOK**

Gary Lucier
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In 1992, the vegetable sector generated 14 percent of crop cash receipts and about 6 percent of agricultural export value, and provided consumers with a low-fat source of many of the nutrients and minerals important to good health. The sector accounts for less than 1 percent of the nation's 2.1 million farms and about 1 percent of all harvested acreage. In the year ahead, the vegetable sector will remain one of the most diverse, least subsidized, and most financially successful components of U.S. agriculture.

There are a number of current issues of importance to the U.S. vegetable industry. These include trade agreements, consumers' food nutrition, food safety, and health concerns, pesticide re-registration, environmental issues (including water availability for irrigation), and the general performance of the U.S. and world economies. While all of these are important economic issues in the sector, most widespread concern is focused on trade and trade agreements, especially the North American Free Trade Agreement (NAFTA). The economic impact of NAFTA on domestic vegetable producers will not be spread evenly across the sector. The effect of NAFTA will vary by commodity with some vegetable sub-sectors benefiting from easy access to the Mexican market while others face increased competition. The U.S. now exports about 7 percent of its' fresh vegetable supplies with Canada as the leading destination. The U.S. imports about 9 percent of total fresh vegetable supply with Mexico the major foreign supplier. About 4 percent of vegetable supplies for processing are exported with 3 percent imported.

The rest of this paper will present the current situation and the near-term outlook for the vegetable industry in the aggregate and for a few of the major sub-sectors.

Industry Aggregate Indicators and Trends

Total sector output likely declined 6 percent in 1992 as lower production of potatoes (down 2 percent), processing vegetables (down 15 percent), and dry beans (down 33 percent) outweighed an estimated 4 percent increase in fresh-market output. The first official estimate of 1992 fresh vegetable production is due out next month and will contain the first U.S. estimates since 1981 of such vegetables as bell peppers, cabbage, watermelon, cantaloupe, and fresh cucumbers. The decline in processing vegetable output was due largely to lower production of tomatoes, which accounts for about 64 percent of processing output. Lower acreage was behind the cut in potato production as well, while a combination of less acreage and smaller per-acre yields dropped dry bean output. Assuming current trends in acreage, yields, and prices, total vegetable output is expected to rise 1 to 3 percent in 1993 with most of the gain on the processing vegetable side.

The index of prices received by growers of fresh market vegetables is expected to increase 10 percent in 1992 due mostly to stronger tomato and lettuce prices. In the year ahead, assuming normal weather

and continued weak economic growth, grower prices will likely remain near 1992 levels while overall fresh-market production is expected to change little.

Retail prices for fresh-market vegetables (including potatoes) likely rose 2 percent in 1992 due largely to higher fourth quarter tomato and potato prices. In the year ahead, fresh retail prices will likely mirror the sluggishness in grower prices and rise only slightly. Retail prices for processed vegetables rose about 1 percent in 1992 as frozen vegetables increased 1 percent and canned vegetables increased slightly. Wholesale prices for dehydrated vegetables (largely potatoes and onions) fell 5 percent during the first 3 quarters of 1992 mostly because of ample supplies of potatoes and onions. In 1993, retail prices for all processed vegetables are expected to increase 2 to 4 percent due to reduced supplies of both frozen and canned items and sluggish foodservice demand caused by the weak economy.

Based on data through the third quarter and projections for the final quarter, the U.S. was a net exporter (in terms of dollar value) of vegetables and melons in 1992. Exports for 1992 are forecast to total about \$2.4 billion while imports are projected at \$1.8 billion. With poor weather reducing imports from Mexico, fresh vegetable imports fell about 15 percent to \$0.9 billion while exports (largely to Canada) rose 2 percent to \$0.8 billion. Although remaining in deficit in fresh vegetables, melons, frozen vegetables, and mushrooms, the U.S. enjoyed trade surpluses in canned vegetables, potatoes, and dry beans. In the year ahead, if weather is normal, the U.S. is expected to remain a net exporter despite a small reduction in fresh exports and larger imports caused by a recovery of Mexican winter production.

In 1992, per capita use of 27 selected vegetables and melons is forecast to increase slightly to about 391 pounds (farm-weight basis). Use increased despite generally lower production because of large stocks (on January 1) of such items as potatoes and processing tomatoes (ERS estimates). Per capita use increased for fresh-market vegetables due largely to stronger domestic production. At the same time, larger stocks supported a small increase in processing use. In the year ahead, per capita vegetable use will depend on available supplies, retail prices, and the general economy. Assuming continued sluggish economic growth, small retail price increases, and normal weather in 1993, per capita use for all vegetables may fall slightly due to lower output of processing vegetables, potatoes, and dry edible beans. However, with the memory of stronger prices in 1992, growers may increase fresh acreage in 1993 leading to lower prices and increased demand.

Cash receipts from the sale of all vegetables and melons is forecast to have declined slightly to \$11.0 billion in 1992. Increased fresh vegetable sales were offset by reductions in the value of processing vegetables, potatoes, and dry edible beans. In 1993, vegetable receipts will likely increase 1 to 3 percent as higher prices increase revenue for most categories.

NAFTA to Reduce Tariffs on Vegetables

The United States, Canada, and Mexico completed negotiations on the North American Free Trade Agreement (NAFTA) on August 12, 1992. Assuming timely approval by Congress, the agreement could go into effect as early as January 1, 1994. The agreement will eliminate all tariff barriers and most non-tariff trade barriers among the 3 countries over the next 15 years. Over a period, not to exceed 15 years, NAFTA will eliminate all tariffs, quotas, and licenses for vegetables. The majority of U.S. vegetables will have tariffs removed either immediately or phased out over 5 years. A relatively small number of vegetables will have tariffs phased out over a longer time period.

The agreement also contains a special agricultural safeguard provision in the form of a tariff rate quota (TRQ). The TRQ is quantity-based and will protect U.S. producers of 6 highly import-sensitive vegetables and melons from sudden import surges. These 6 are fresh tomatoes marketed from 11/14 to 7/14, fresh onions marketed 1/1 to 4/30, eggplant marketed 4/1 to 6/30, chili peppers marketed 10/1

to 7/31, fresh squash marketed 10/1 to 6/30, and watermelons marketed 5/1 to 9/30. Under the safeguard provisions, a certain amount of trade can enter at the preferential NAFTA rate, but higher tariffs are automatically triggered when imports reach a specific quota level. Together these 6 commodities account for a substantial share of U.S. fresh vegetable imports. The categories for tomatoes, squash, and eggplant are important winter/spring fresh vegetables in Florida which compete at times with Mexico for the U.S. market.

Situation and Outlook for Selected Fresh Vegetables

Tomatoes

Fresh tomato production likely remained flat in 1992 as increased output during the spring (Florida yields were strong) was offset by reduced winter and fall volume. Fall acreage is down 14 percent this year in Florida primarily because of low prices both last fall and at planting time this summer. U.S. tomato shipments likely totaled near last year's level.

Shipping-point prices for fresh tomatoes are expected to rise about a tenth from 1991 to about \$35 per cwt in 1992. At retail, tomato prices are expected to increase 5 percent to about \$1.05 per pound. The keys to price changes in 1993 include winter weather in Florida and Mexico and spring weather in California. With no weather disruptions, prices at all levels of the marketing chain are expected to rise only slightly with 1993 shipments expected to total above those of 1992.

Although no direct impact on national tomato prices occurred at the time of Hurricane Andrew, they may be felt this winter (December - February) when lower production brought on partly by reduced acreage in the Homestead area of southern Florida is marketed. Winter prices for warm-season vegetables will depend on both the level of production in Florida and the quantity of imports from Mexico. However, it may have been difficult for Mexican producers to increase acreage in response to the hurricane because of unusually heavy rain in West Mexico that hampered planting this fall. Acreage for export in West Mexico is reportedly well below that of a year ago.

Through the first 3 quarters of 1992, tomato import value declined 50 percent due largely to January flooding in Mexico, a major source of U.S. fresh winter tomatoes. Fresh tomato imports are projected to decline 45 percent in 1992. However, with more normal Mexican volume this winter and spring, U.S. imports will average above the low levels of 1992.

Fresh tomatoes were the leading U.S. fresh vegetable export in 1991. With a 20 percent increase in volume caused by reduced availability of Mexican product, fresh tomato exports are forecast to have risen 10 percent to \$125 million during 1992. In 1993, with the volume of Mexican tomatoes closer to normal, the value of U.S. fresh tomato exports will likely decline.

Per capita use of commercial fresh tomatoes (farm-weight basis) is estimated at 15.1 pounds in 1992, about the same as a year ago. Although use was flat in the 1970's, it picked-up during the 1980's due partly to increased popularity of restaurant salads and salad bars and the rising interest in nutrition. With overall supplies expected to show small increases and foodservice sales to remain sluggish, per capita fresh tomato use is not likely to change much in the year ahead.

Head Lettuce

Head lettuce production likely fell in 1992 despite increased acreage during the winter, spring, and summer seasons. Fall acreage is off 6 percent with most States expecting to harvest fewer acres.

With reduced output, U.S. head lettuce shipments fell 3 percent during the first 3 quarters of 1992 but are expected to increase from the whitefly-affected fourth quarter of 1991. Lettuce supplies, likely about 56 million cwt in 1992, are lower for the third consecutive year.

Shipping-point prices for fresh head lettuce are expected to rise 6 percent to about \$12.00 per cwt in 1992. At retail, lettuce prices are expected to average just under last year's \$0.61 per pound. Although varying from month-to-month, on an annual basis, changes in grower prices are highly correlated with changes in retail prices. Given steady demand, the keys to price changes in 1993 include winter and spring weather in California and Arizona, the continuing California drought, and the level of whitefly activity in western States this coming summer and fall.

During 1992, head lettuce exports likely rose 3 percent with Canada receiving the majority (85 percent). As the world's leading lettuce producer, the U.S. imports little head lettuce (less than 1 percent of supply).

Per capita use of head lettuce is estimated at 26 pounds in 1992, down slightly from a year earlier. After gaining 29 percent between 1970 and 1989, per capita use of head lettuce appears to have stabilized or fallen slightly. This may be due partly to competition with a myriad of leaf lettuces which are becoming more common in retail markets and salad bars.

Onions

Onion production rose 5 percent to a record 53.2 million cwt as both per-acre yields (1 percent) and area harvested (4 percent) rose. An 18 percent increase in spring production was followed by a 5 percent increase in summer production (storage and non-storage), excluding the 5 percent decrease in California's mostly processing crop. The summer storage crop of 30.6 million cwt is 6 percent more than a year earlier. With larger production, shipments of dry-bulb onions were 2 percent higher during the first 3 quarters of 1992.

The increased production of onions has forced average grower prices down in 1992, but not to the low levels last seen in 1990. Greater than normal shrinkage and loss has been observed in a number of storage areas, limiting marketable supplies. Season average grower prices for onions are likely to be around \$12.00 a cwt in the 1992/93 marketing year, down from \$12.50 in 1991/92. Retail prices will likely average around \$0.42 a pound, down from \$0.46 a year ago.

The volume of all fresh onion exports increased 8 percent during the first 3 quarters of 1992 over a year earlier. Canada accounted for 85 percent of the total. Onion imports declined 17 percent in the first 3 quarters of 1992 due to last year's large storage crop and strong seasonal production this year. With strong production in the U.S. and lower prices, U.S. onion exports will likely increase during the final quarter of 1992 and through the first half of 1993.

In terms of per capita use, onions are the third most important fresh vegetable behind potatoes and lettuce. Per capita use of all onions is projected to total close to 19 pounds in 1992. With new sweet varieties and strong foodservice demand, per capita onion use has been trending upward since 1980, gaining more than 40 percent. With a large crop and strong demand, per capita onion use will likely total about 19 pounds in 1993.

Sweet corn

Fresh sweet corn harvested acreage increased about 6 percent in 1992 with most of the increase coming during the spring and summer seasons. Although acreage was up, fresh shipments through

September were down about 9 percent indicating the cool, wet summer may have impacted yields. Shipping point prices averaged about even with a year earlier through October, although a crate of Florida corn was 30-40 percent above a year earlier in early November. The U.S. imports very little fresh sweet corn but exports about \$15 million (about 5 percent of supplies), mostly to Canada. Through the third quarter of 1992, exports were 44 percent above a year earlier but with prices higher, export volume will likely fall for the last 3 months.

Per capita use of fresh sweet corn, which has been flat since 1980, totaled about 6 pounds in 1992. In the year ahead, with average production, per capita use is expected to remain about the same as in 1992.

Carrots

Based on seasonal acreage data, harvested carrot acres for all uses is forecast to rise about 10 percent in 1992. About 68 percent of all carrots are sold in the fresh market. California accounts for about 70 percent of fresh market output and 25 percent of processing production (Washington is the largest carrot processor with 30 percent of the crop). Much of the additional 1992 acreage was spurred by strong prices prevalent throughout the 1991 season. Despite higher acreage, fresh carrot shipments averaged 3 percent lower during the first 3 quarters of 1992. As a result, shipping-point prices for fresh carrots averaged about 10 percent higher through October compared with 1991. Continued strong returns will likely spur further increases in acreage for 1993. The U.S. is a net exporter of fresh carrots with about 9 percent of total supply sold to other countries. Through the first 3 quarters of 1992, export volume fell 3 percent while imports (mostly from Canada) rose 6 percent.

Per capita use of fresh carrots is projected at 7.5 pounds for 1992--about the same as a year earlier. Carrot use has risen about 22 percent since 1980 with most of the gains coming since the late 1980's. In the year ahead, if higher grower prices spur increased production and lower retail prices, per capita use could rise to near 8 pounds.

Celery

Celery supply and demand is best described as steady. Harvested acreage for celery is projected to increase 2 percent from 1991's 33,010 acres--a level similar to that of 1970. At the same time, per capita use of celery, which was about 7 pounds in 1992, was 7.3 pounds in 1970 and has been around 7 pounds for most of the past 20 years. Unweighted shipping-point prices are projected to have risen about 8 percent in 1992 with retail prices averaging \$0.51 per pound, down 2 percent from 1991.

The U.S. is a net exporter of celery with 85 percent of export volume shipped to Canada and about 12 percent of total supply exported. During the first 3 quarters of 1992, exports increased 5 percent while imports surged 70 percent due to unusually strong second quarter imports.

Broccoli

In terms of gains in per capita use during the last 12 years, broccoli was the star of the 1980's among fresh vegetables with a 136 percent increase to an estimated 3.3 pounds in 1992. Use actually peaked in 1988 and 1989 at 3.8 pounds with production and use after 1989 declining moderately. Growers in many other States, notably Maine and Virginia, are now also producing commercial quantities of broccoli which USDA is not currently capturing in official statistics. If output from these States were included, per capita use might be closer to the levels of 1988 and 1989.

Harvested acreage may be up as much as 9 percent in covered States in 1992 with fresh broccoli shipments totaling an estimated 6 percent higher than a year earlier. Despite much higher volume, shipping point prices averaged about 3 percent below a year earlier.

Fresh broccoli exports were up 5 percent from a year earlier during the first 3 quarters. With more acreage this fall and good growing conditions, export volume may increase during the final quarter and into early 1993. The U.S. does not import much fresh broccoli but imports of frozen broccoli (largely from Mexico) have been rising and now account for 50 percent of total processing broccoli supply.

Situation and Outlook for Selected Processing Vegetables

Tomatoes

After 3 consecutive record tomato crops (1989-91), low product prices and heavy stocks (based on ERS analysis) characterized the processing tomato industry coming into 1992. To alleviate this situation, processors contracted for fewer tomatoes in 1992 and production declined 20 percent. The smaller crop was caused entirely by reduced area with contract acreage falling 22 percent. Yields improved in all States except Indiana and Colorado with the U.S. average hitting a record-high 31.7 short tons per acre. Although the smaller crop will help reduce burdensome stocks and lend support to soft product prices, ERS estimates suggests stocks may still be high relative to use in 1993/94. Because of the high stocks-to-use ratio, 1993/94 tomato acreage will likely rise little from this year's reduced level.

Now that the stage is set for some reduction in available supplies in the coming year, tomato product prices are beginning to level off and increase slightly. Over the past 2 years, wholesale tomato paste prices have fallen to very low levels. In the third quarter of 1992, prices for bulk tomato paste (33 percent solids) in 55-gallon drums averaged around \$0.31 per pound, down 9 percent from last year and 34 percent below the 1988-90 third-quarter average.

On a positive note, large supplies and low tomato prices have resulted in increased exports. Through the first 3 quarters, the export value of processed tomato products was 57 percent higher than a year earlier and 156 percent above 2 years ago. In fact, for this time period the value of tomato product exports (\$119 million) exceeded that for all of 1991 (\$106 million). In terms of volume, tomato paste exports were 80 percent higher than a year ago and 2 percent above the total for all of 1991. Canada continues to be the largest market for U.S. processed tomato products with 55 percent of total 1992 export value, but exports to Japan, Korea, and the EC have grown at a faster rate over the past few years.

Large supplies have also resulted in higher per-capita use which averaged an estimated 71 pounds (fresh-weight basis) during the 1990-92 period. This compares with 65 pounds during the previous 3 years (1987-89) and 61 pounds during the 1980-82 period. Per-capita use will likely remain in the 70 pound range next year as processors continue to whittle inventories.

Sweet Corn

Sweet corn processors generally began 1992 with moderately high inventories and a need to trim production from 1991's record output. Wholesale prices for canned and frozen sweet corn have been relatively low since 1991. Although there is a bit of uncertainty regarding sweet corn production levels (final data are reported in January), output is currently estimated to have fallen 2 percent to 3.3 million short tons. This uncertainty stems from a killing frost which prematurely ended a Wisconsin harvest season that was already late due to a June frost and a cool, wet summer. Wisconsin generally

accounts for about one-quarter of U.S. processing sweet corn production. Assuming Wisconsin's harvest was not substantially different than the 19 percent drop in production already forecast, the stocks-to-use ratio going into next season for both canned and frozen corn may be about average. Under this scenario, processors will likely contract for more sweet corn in 1993. Per capita use (farm-weight basis) of canning corn totaled about 11 pounds in 1992 while freezing corn totaled about 8.5.

Export volume for canned and frozen sweet corn increased 4 and 6 percent, respectively, during the first 3 quarters of 1992. Canned exports, which accounted for 12 percent of supply in 1991, move mainly to Japan, Taiwan, Germany, and the United Kingdom. Frozen exports accounted for 10 percent of supply in 1991 and are also sold mainly to Japan and Canada. Continued slow growth is expected in 1993 for both canned and frozen sweet corn exports as world economic conditions remain sluggish.

Green Peas

Green pea processors began the 1992 season with diverging inventory levels--estimated canned stocks were somewhat below the low-run trend while frozen pea stocks were slightly higher than average. As a result canners contracted for increased green pea acreage (up 5 percent) while freezers contracted for less (down 6 percent). Total production fell about 1 percent in 1992 with output for freezing likely down a bit more due to unseasonably hot spring weather in the Pacific Northwest which reduced yields. Washington, which accounted for 15 percent of 1992 processing green pea output, realized a 22 percent decline in yields to 1.5 tons per acre--the lowest since 1983. In the year ahead, with canned and frozen wholesale prices only slightly higher than a year ago and stocks about the same as last season, processors may again contract for about the same acreage as in 1992. Per capita use of green peas for freezing has risen 22 percent since 1980 to 2.2 pounds in 1992. However, use of green peas for canning has fallen 30 percent during the same period to 1.9 pounds per person.

Trade is not a major factor in the processing green pea sector. As a percent of supply, the U.S. exports about 2 percent of the available supply of both canned and frozen green peas. For both sectors, imports exceed exports with 3 percent of canning and 4 percent of freezing green pea supply imported.

Snap Beans

Because of above-average stocks of both canned and frozen snap beans, processors contracted for fewer acres for the 1992/93 season. Acreage for canning (down 11 percent) and freezing (down 14 percent) were each cut. Although yields averaged 2 percent higher, snap bean production fell 10 percent due to reduced harvested acreage. Reduced output this year should return inventories to average levels and spur increased acreage in the 1993/94 season. Wholesale prices are currently around year-ago levels but are likely to increase somewhat next year. Per capita use of canning snap beans has been trending slowly downward, dropping about 9 percent between the average of the 1990-92 and the 1980-82 periods. Like other frozen vegetables, per capita use of snap beans for freezing has risen over time--increasing 20 percent between the averages for 1980-82 and 1990-92.

Like green peas, trade is a minor player in the U.S. processing snap bean market. Exports account for about 1 percent each of the supply of canning and freezing snap beans. Imports account for about 1 percent of the freezing snap bean supply and less than 1 percent of the canning supply.

Situation and Outlook for Other Vegetables

Potatoes

The first estimate (made in November) of U.S. fall potato crop is 364 million cwt, 2 percent below last year's record crop, but still the second largest crop ever. Harvested acreage declined 5 percent while yields averaged a record 325 cwt per acre, 3 percent more than the previous high of a year ago. Yields tied or set new highs in nine States (including Idaho, Michigan, North Dakota, and New York) and were much improved in eastern States hit by drought in 1991. Production in the western States totaled 243 million cwt, 5 percent less than last fall. Crops were smaller in all major western States, especially in Washington where acreage was down and hot weather cut yields. Despite an early frost, yields in Idaho were record-high (321 cwt) and would have been even greater given 2 more weeks of growth. Production in Idaho totaled 121 million cwt, 2 percent less than last year. Strong yields in Maine pushed production up 23 percent from last year's drought-shortened crop. However, shrinkage in Maine may be larger than a year ago due to rain and high temperatures during harvest.

With a smaller potato crop, the 1992/93 U.S. season average price is expected to be above a year earlier, perhaps in the \$5.00 to \$6.00 per cwt range (compared with \$4.96 in 1991/92). The retail price for fresh round white potatoes averaged 30.4 cents per pound during the first 3 quarters of 1992, down 10 percent from the previous year. With supplies remaining abundant, retail potato prices will likely remain low (relative to historical trend) over the next several months.

The U.S. continued to post a positive net export value for potatoes through the first 3 quarters of 1992. During this time, the net value of potato trade (export less import value) totaled \$186 million, up 42 percent from the same period in 1991. The value of 1992 exports increased 13 percent to \$250 million. However, import value fell to \$64 million as a result of stronger 1991/92 production and lower prices in the U.S. On a fresh-weight equivalent basis, the volume of potato exports totaled 17.5 million cwt during the first 3 quarters of 1992. In all of 1991, export volume accounted for about 19 million cwt of fresh-weight equivalent potatoes with frozen products accounting for 8 million cwt.

Through the first 9 months of 1992, exports of frozen french fries to Japan increased 7 percent over a year earlier to 177 million pounds. Japan accounted for 63 percent of total U.S. frozen-fry export volume compared with 68 percent for all of 1991. Fry exports also go to such countries as Taiwan, South Korea, Indonesia, and Canada. With the number of fast food restaurants likely approaching the market saturation point in Japan, the next question may be where do we go next for big gains in fry exports. The answer may well be Mexico, followed by other Latin American countries. With fast food chains now reportedly investing in Mexico and sourcing their french fries in the U.S., further rapid growth may soon occur in U.S. frozen fry exports.

Dry Edible Beans

U.S. dry bean production is expected to decline 35 percent in 1992 to 22.1 million cwt. This would be the smallest dry bean crop since 1988. Lower output, reflecting low prices and burdensome inventories, was the result of a 22-percent drop in harvested acreage combined with 16-percent lower yields. North Dakota and Michigan, the two largest dry bean producing States, expect to produce 38 and 43 percent less than a year ago. Reductions in acreage, yields, and production are magnified because they follow last year's record-breaking season.

With record production in 1991/92 and large stocks, wholesale prices for major dry bean classes were below year-earlier levels for the first 3 quarters of 1992. Pinto bean prices averaged \$19.00 per cwt during this time, 4 percent lower than a year ago. Navy (pea) beans averaged \$18.78 per cwt during the first 9 months of 1992, down 8 percent, while Great Northern beans averaged \$19.35, down 11

percent from 1991. For dry beans as an aggregate, prices have averaged 44 percent above a year ago since the new crop became available in September.

Exports are very important to the dry edible bean industry, accounting for about a fourth of total supplies. After strong dry bean exports in calendar 1991, total export volume for the first three quarters of 1992 is down considerably, about 23 percent below the comparable period in 1991. Substantial decreases were reported for Great Northern beans, baby limas, other limas, navy beans, pintos, garbanzo beans, and blackeye cowpeas. Increases were reported for kidney beans, seed beans, small red, and miscellaneous white beans, while black bean exports were virtually the same as year earlier. Based on 1991 data, pinto beans account for about 25 percent of exports while navy (pea) beans also account for 25 percent, and Great Northern beans just under 9 percent. Through the first 9 months of 1992, Mexico was the most important pinto export market, taking 32 percent of U.S. pinto exports while the United Kingdom took 60 percent of the navy beans. If export markets do not strengthen during the next year and help increase dry bean prices, dry bean acreage in 1993/94 will not increase much from present levels.

Sweet Potatoes

Sweetpotato acreage for harvest in 1992 has been estimated at 80,700 acres, up about 4 percent from 1991. Louisiana, the second largest sweetpotato-producing State, had the greatest increase in harvested acres (about 2,000 more than 1991), and the greatest percentage increase from 1991 (13 percent). Harvested acreage in California is also expected to be up nearly 11 percent from 1991, while North Carolina, the largest sweetpotato-producing State, is expected to remain at about 30,000 acres harvested. This would lower North Carolina's share of U.S. acreage to about 37 percent, down from 39 percent in 1991. Louisiana accounts for another 22 percent of harvested acreage, and California 11 percent.

If U.S. yields were to match last year's 148 cwt per acre, 1992 production would approach 11.9 million cwt. This level of output would likely drop sweetpotato prices below last year's average of \$13.20 per cwt, possibly into the \$12 to \$13 range. If yields were to be only 135 cwt per acre, production could fall to as low as 10.9 million cwt, which could raise prices to over \$14 per cwt. Early fall shipping point prices for North Carolina and California Jewels were running 10 to 25 percent lower than a year earlier. Trade is not a major factor in U.S. sweetpotato markets with about 1 percent of supply exported and 4 percent imported. About 99 percent of imports come from the Dominican Republic and are destined for Puerto Rico. Imports are projected to rise 8 percent in 1992.

Mushrooms

Mushroom producers expect to utilize 135 million square feet of growing space during the 1992/93 growing year. This is slightly less than the 137 million utilized for the 1991/92 crop. With total agaricus yields averaging around 5.32 pounds per square foot, total 1992/93 production may reach only 718 million pounds, a 3 percent decline compared with last year. Given the trend for approximately 70 percent of the total crop to go for the fresh market, fresh sales may reach 495 million pounds. However, this will depend on fresh market price strength throughout the remaining year and unmet processing demand. Processors can expect to receive as little as 223 million pounds, compared to 246 million pounds in 1991/92. However, canned imports are likely to rise this marketing year, bringing the total canned mushroom supply close to last season's.

Specialties

Specialty shipments during the first three quarters of 1992 rose 1 percent from a year earlier to 11.8 million cwt. While supplies were down 8 percent during the first quarter, second and third quarter shipments increased 10 percent and 4 percent over the previous year. Specialty shipments include fancy salad greens, oriental and tropical vegetables, chili peppers, parsley, garlic, horseradish, basil, watercress, chayote, jerusalem artichokes, jicama, and tomatillos, and are reported by the Agricultural Marketing Service (AMS). Over 72 percent of specialty shipments were from domestic sources during the first three quarters of 1992, the same proportion as last year. Most Chinese cabbage, fancy salad greens, parsley, and all tropical vegetables were imported.

Shipments of fancy salad greens were up during the first three quarters compared with last year. Escarole and endive shipments increased 36 percent to 195,000 cwt, Romaine was up 9 percent to 3.9 million cwt, and other fancy lettuces (including Boston, Bibb, red and green leaf, oak leaf, and Russian red mustard) increased 2 percent to 2.9 million cwt. Romaine and other fancy lettuces are primarily shipped from California, while Florida, Belgium, and Italy are the primary sources for escarole and endive.

Aggregate vegetable Indicators, 1990-93

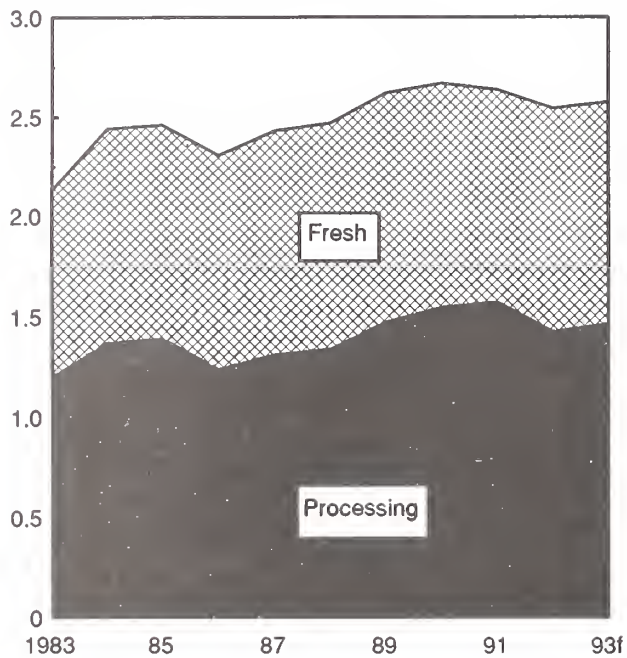
Item	Unit/Period	1990	1991	1992f	1993f
Prices and value:					
Commercial vegetable grower price index 1/	1977=100	142	136	149	149-153
PPI - Fresh vegetables 2/	1982=100	107.8	100.2	110.0	110-114
- Canned vegetables	do.	116.6	112.8	110.0	110-114
- Frozen vegetables	do.	118.5	117.6	116.0	116-120
- Dehydrating vegetables	do.	183.6	153.6	148.0	150-154
CPI - Fresh vegetables 3/	1982-84=100	151.1	154.2	157.0	158-162
- Processed vegetables	1982-84=100	127.5	128.5	130.0	132-136
Prices paid by farmers, all items 1/	1977=100	184	189	189	188-192
Ratio of farm price to prices paid 4/	1977=100	77	72	79	78-82
Cash receipts for all vegetables 5/	\$ Billions	11.5	11.3	11.0	11-12
- Percent in top two states 6/	Percent	43.6	45.4	--	--
Output and area:					
Total domestic vegetable output 5/ 7/	1977=100	135	135	129	129-133
Harvested area - Major vegetables 1/	1,000 acres	6,122	5,877	5,330	5,200-5,600
- Fresh vegetables	do.	1,120	1,066	1,100	1,050-1,150
- Processing vegetables	do.	1,548	1,574	1,435	1,450-1,500
- Potatoes	do.	1,371	1,374	1,305	1,300-1,350
- Dry edible beans	do.	2,084	1,863	1,490	1,400-1,600
Trade value: 8/					
Total vegetable exports	\$ Millions	1,966	2,118	2,400	2,100-2,500
Total vegetable imports	do.	2,001	1,917	1,800	1,700-2,100
Vegetable trade balance 9/	do.	-35	201	600	200-600
Per-capita utilization: 5/					
All vegetables	Pounds	393.0	390.0	391.0	386-390
Fresh	do.	136.3	129.0	132.0	131-135
Processing	do.	111.6	113.7	112.0	109-113
Potatoes, all	do.	129.8	131.4	133.0	127-131
Dry edible beans	do.	6.0	7.1	6.5	5-6

f = forecast. -- = not available.

1/ Source: USDA, NASS. 2/ Producer price index (PPI) from BLS, U.S. Dept. of Labor (USDL). 3/ Source of the consumer price index (CPI) is BLS, USDL. 4/ The ratio of the commercial vegetable grower price index to prices paid by farmers. 5/ Source: USDA, ERS. 6/ The percentage of vegetable cash receipts originating in California and Florida. 7/ Index of farm output. 8/ Source: Bureau of the Census, USDC. Items included in these calendar year aggregations may differ from others published by USDA. 9/ Value of exports less the value of imports.

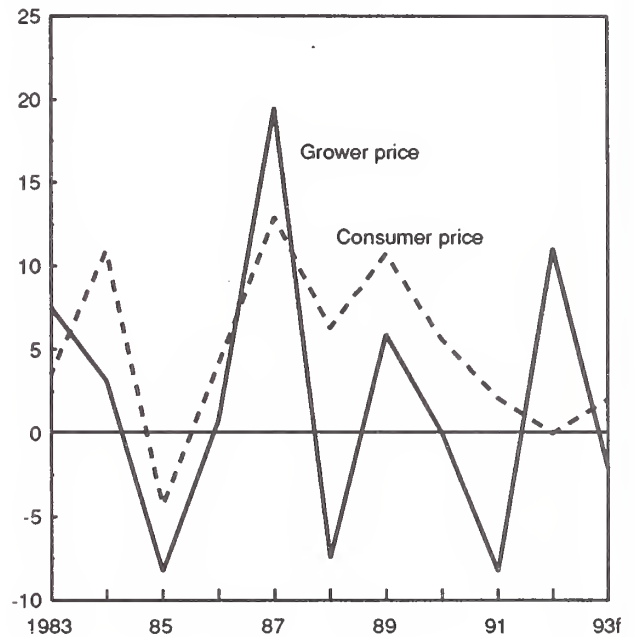
Selected Fresh and Processing Harvested Acreage, 1983-93

Mil. acres



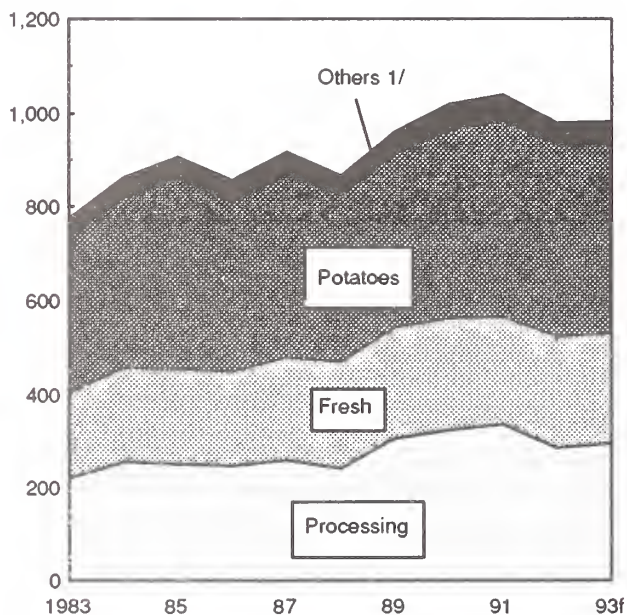
Changes in Fresh Vegetable Prices, 1983-93

Percent change from year ago



U.S. Vegetable Production, 1983-93

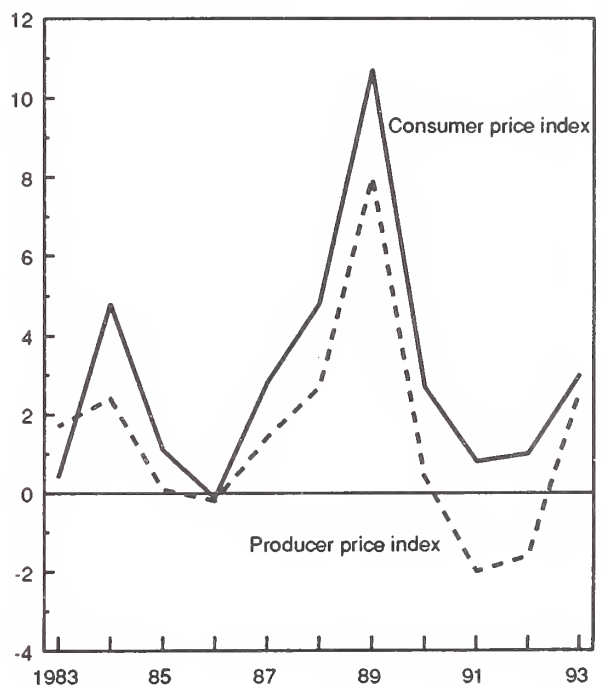
Mil. cwt



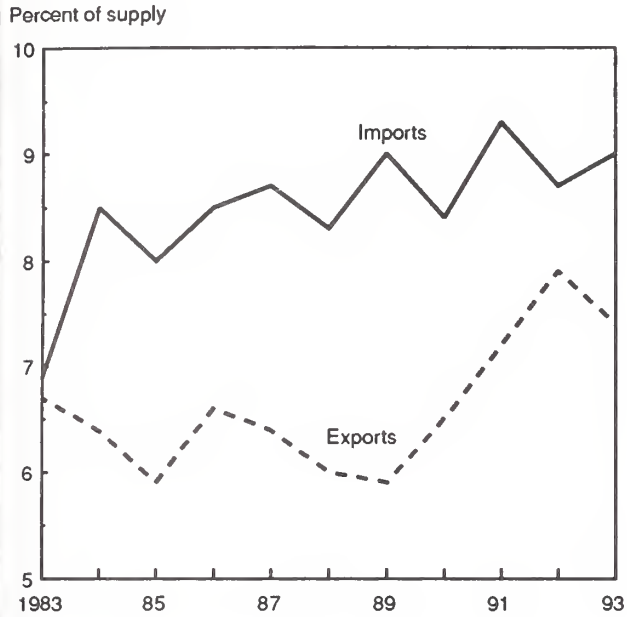
1/ Includes pulses, sweetpotatoes, and mushrooms.

Changes in Processed Vegetable Prices, 1983-93

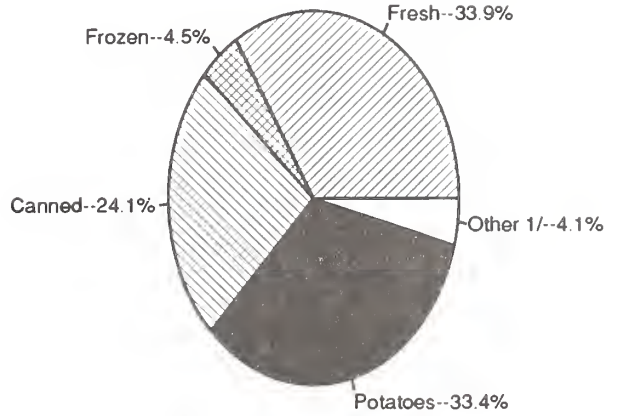
Percent change from year ago



Selected Fresh Vegetable Trade: Share of Supply

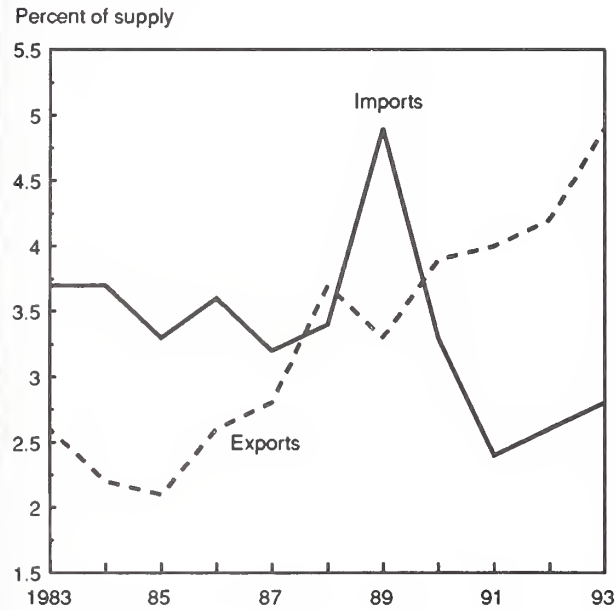


Per Capita Vegetable Use, 1992



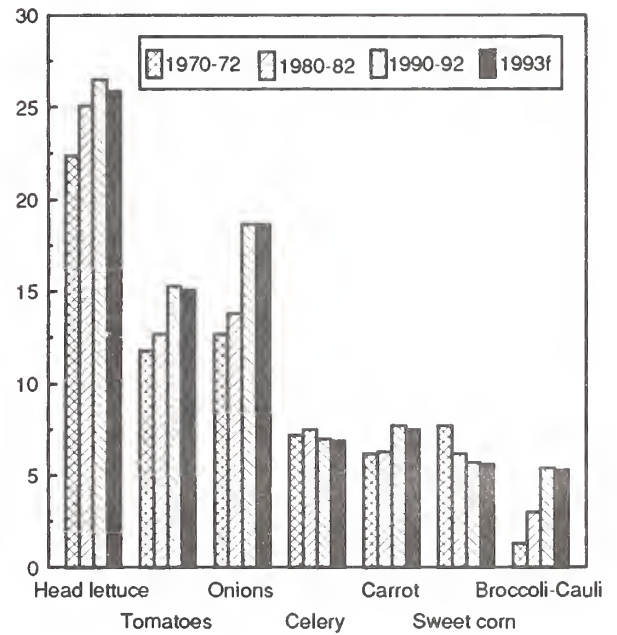
1/ Includes pulses, sweetpotatoes, and mushrooms.

**Selected Processing Vegetable Trade:
Share of Supply, 1983-93**



Per Capita Fresh Vegetable Use, Major Items

Pounds, farm weight



Outlook '93

For Release: Wednesday, December 2, 1992

**FORCES SHAPING CHANGE IN PRODUCE RETAILING AND MARKETING
TOWARD THE YEAR 2000**

Edward W. McLaughlin
Associate Professor of Marketing
Food Industry Management Program
Cornell University

Retail produce managers, like the supermarket companies in which they play an increasingly critical role, are striving to adapt their retail programs to the new realities of their ever changing shopper clientele. As consumers change in both demographic profile and in lifestyle, so do their food preferences, shopping, preparation and consumption behaviors.

This presentation focuses on the new directions being taken by retail produce operations as they respond to changing consumers and attempts to project these changing responses for the future. Implications of these new retail directions will be developed for fresh produce marketers as they move toward the year 2000.

The following five challenges are the major forces shaping change for produce retailers and marketers.

O Challenge: Continued demands for convenience

Consumer demands for convenience is one of the strongest consistent trends of the past 45 years and, with continued increases projected in women working outside the home and disposable incomes as well as new technological improvements, this trend can safely be forecast to guide food marketers well into the next century. The produce industry has responded to this need for convenience not only in terms of facilitating preparation but in consumption and cleanup activities as well. The following successful responses are illustrative of likely future directions.

Produce Industry Responds

- o salad bars, potato bars, dessert bars
- o precut vegetables

- o party platters
- o prepackaged salad meals, salads-to-go
- o fresh prepared foods--storewide

O **Challenge: Full service versus new value orientation**

Although many food retailers turned to bulk produce presentations during the 1980s, often accompanied by elaborate full service merchandising approaches, the early 1990s has presented new economic realities to consumers and retailers. The recession has taken the stigma out of bargain hunting: membership warehouse clubs now account for about 5% of all retail food sales and are just beginning to move into fresh produce. This alternative format of food sales has prompted a new era of cost consciousness among retailers in virtually every aspect of their operations, including fresh produce.

Produce Industry Responds

- o service islands
- o club stores--bulk packs
- o segmentation is key
- o more value added at shipping level
- o new alliances forming

O **Challenge: Heightened interests in nutrition, healthfulness, food safety and the environment**

As new scientific and medical evidence heightens consumers' awareness of the importance of diet, health and the environment to their daily well-being, more consumers want to understand how they should respond. In some cases, like nutrition, facts appear to favor fresh produce but in others, the use of pesticide for example, effective responses are needed. Marketers of the future will increasingly play a role in helping their customers and shoppers to sort through these complex issues. Already some effective responses are occurring:

Produce Industry Responds

- o 5-a-day program
- o organics
- o pesticide residues

O **Challenge: Quest for quality**

The quality of produce has risen remarkably in the last ten years. Out-of-condition products simply no longer have a role to play in the contemporary produce system.

As consumers become increasingly more discriminating produce shoppers, as technology advances, and as suppliers become more sophisticated in production, distribution and marketing methods, further improvements in quality can be expected in the future.

Produce Industry Responds

- o produce image in supermarket
- o information versus brands
- o packaging
- o appearance
- o consistency

O **Challenge: Appeal of produce variety and excitement**

As shoppers grew accustomed to the new product variety in grocery products, they began to expect the same treatment from the produce aisles and, in large part the industry responded: throughout the 1980s, packers and processors developed new products, new packs, and new flavors, while importers followed suit with record volumes of new foreign varieties. The consequence has been unequivocal; a more appealing, exciting environment in which to shop for fresh produce has thrust sales to new industry highs. The greater ethnic diversity expected in the American shopping public will likely combine with the growing sense of eating adventure and desire for fresh ingredients to further accelerate this trend in the future.

Produce Industry Responds

- o new items--specialties, exotics
- o cooking interests
- o breeding and technology
- o microwavability

Outlook '93 For Release: Wednesday, December 2, 1992

PRODUCE CONSUMPTION

* *

MARKETING STRATEGIES DRIVING FUTURE GROWTH

David O. Marguleas
Senior Vice President, Marketing
Sun World International

Good afternoon and thank you. I was asked to be with you today to represent the fresh fruit and vegetable industry and to share with you some marketing strategies driving future growth. This year, most Americans will eat about 250 pounds of fresh fruit and vegetables. Throughout the 1970s and 1980s, our produce choices changed -- we opted for more broccoli, grapes and colored peppers and fewer oranges, cabbage and watermelon -- but total fruit and vegetable consumption has increased moderately. While countless factors affected eating trends during the last decade, this presentation focuses on three dynamic forces which promise to further propel produce consumption levels in the 1990s. During the coming decade, the FIVE-A-DAY program, PRIVATE (BRANDED) PROMOTIONAL efforts and GENERIC COMMODITY BOARD activities are well positioned to stimulate produce awareness and consumption far beyond their present levels. These three major and very different marketing thrusts, in conjunction with several important demographic and lifestyle changes underway, pave an extraordinary path for our fresh food industry.

I. FIVE A DAY

The FIVE-A-DAY program is a unique industry partnership between the National Cancer Institute and the produce and supermarket industries; it was founded in October 1991 with the simple mission of encouraging Americans to nearly double their fresh fruit and vegetable consumption to 5 servings per day between now and the year 2000.

1. Few get their five (slide)
2. We've got a lot to learn (slide)

This multi-million dollar effort consists of an extensive advertising, promotion and public awareness campaign as well as participation by several hundred supermarket retailers and grower-shippers around the country. Some understand the health benefits of eating fresh produce better than others.

3. Women doing better than men (slide)
4. Even those who do best eat less (slide)

But, clearly we have a great health challenge ahead of us in trying to change these eating habits.

Let's take a quick look at some of the promotional activities which comprise the 5-a-day program:

5. Super fresh retail ad (slide)
6. Rice markets retail ad (slide)
7. In-store poster
8. In-store poster
9. Store signage (panorama)
10. In-store poster
11. Nutrition poster
12. Nutrition poster
13. Recipe signage
14. Point-of-sale applications
15. News clip / P.R.
16. News clip / P.R.
17. Packaging (over-wrap)
18. Packaging (potato bag)
19. Ready-to-eat signage
20. 5-A-day pamphlets

As you can see, this government/industry effort has ambitious goals and some dynamic program elements to help it reach those goals. But 5-a-day can't accomplish all of this alone.

II. PRIVATE INDUSTRY

Private industry, consisting of growers & shippers and marketing companies, plays a critical role in boosting produce consumption.

And, with more than \$35 billion of fruit and vegetables sold in U.S. supermarkets last year, (about one-third of which were branded) we can expect to see even more aggressive brand building activities in future produce departments. We'll see consumer advertising and promotion of venerable produce brands such as Chiquita, Dole and Sunkist and significant new efforts on behalf of premium 90's varieties and brands like Driscoll strawberries, Nunes' Foxy lettuce and Sun World's DiVine Ripe® tomatoes. And, continuing traditional efforts such as

- 21 Sampling (Le Jaune Royale® and Divine Ripe)
22. Co-op advertising (Dominick's)
23. In-store promotion (pepper display)
24. Consumer advertising

Private marketing companies and retailers are jumping on the nutrition bandwagon as well, using produce's powerful health benefits to heighten awareness and drive sales. The more consumers understand the benefits of eating fruits and vegetables, the more they'll eat --

25. Nutrition chart -- discuss school program.

And, technologically, our industry has made tremendous advances by extending the seasonality, improving the flavor, convenience and overall quality of the varieties we're growing. In the last year, we've heard a great deal about tomato improvements and biotechnology. At Sun World we've chosen to focus on improving already popular products as a means of building sales and consumption.

26. Seedless watermelon (picnic shot)
27. Seedless watermelon (bin)
28. Le Rouge Royale® and Le Jaune Royale peppers
29. DiVine Ripe tomato

An in-house research and development program

30. Lab shot
31. Black diamond™ plum

continues to produce better tasting fruit varieties that are available to consumers for longer seasons. These and countless other varieties create supermarket excitement and traffic and respond to consumer interests in more flavorful produce.

III. COMMODITY BOARDS

But there's a third and very powerful promotional force at work as well - - commodity boards. Generic commodity marketing orders, have never been more critical (or controversial) a component in our industry's marketing activities.

More than 350 state and federal marketing orders, govern more than 80 crops and collect and spend more than \$500 million each year. These marketing orders represent nearly 120,000 growers who collectively produce crops exceeding \$4.5 billion in farm value sales. These commodity boards -- with budgets ranging from \$100,000 to \$15 million and representing as few as 15 growers and as many as 47,000 - - collectively and effectively promote their products while keeping a cautious eye on longer-term production and consumption trends. (Nearly all of the 10 commodities registering the largest consumption gains in the last 12-15 years are supported by significant generic promotional programs.)

32. California Tree fruit agreement (sampling)
33. California Tree fruit agreement (ripe program)
34. California Avocado Commission logo (ripe program)
35. California Avocado Commission (P.O.S.)
36. California Avocado Commission (merch. collateral)
37. California Avocado Commission (recipe pads, merch. displays)
38. California Grape Commission (logo)
39. California Grape Commission (display)

The watermelon and kiwi fruit industry represent another example of the important role which commodity boards play. After 10-15 years of declining consumption, the U.S. Watermelon industry 3 years ago formed the National Watermelon Promotion Board and the California and New Zealand Kiwifruit Commodity Organizations helped popularize the kiwi. But, these boards draw ire (as well as accolades) when our industry's volatile supplies outpace demand. Two recent examples of this lie with the California Tree Fruit Agreement and their plum order as well as the California Iceberg Commission.

In summary, together, the industry/government 5-a-day program, private promotional and research endeavors and aggressive generic commodity board activities represent three dynamic marketing strategies which will continue to drive future produce consumption.

DEVELOPMENTS AT THE AARC CENTER

AARC is an acronym that stands for Alternative Agriculture Research and Commercialization. AARC center's purpose is to generate widespread interest and profitable investment in developing and commercializing new industrial and consumer products that use farm and forestry materials -- with preference for projects that benefit rural communities and are environmentally friendly.

The AARC center exists as an independent entity within the U. S. Department of Agriculture. On March 6, 1992 Secretary Madigan appointed the AARC Board with seven of the nine members representing the private sector. The Board has knowledge and broad experience in marketing, product development and technology.

The Board convened its first meeting on April 13-14. At that time, I was elected chair, and the Board asked Dr. Paul F. O'Connell to serve as Acting Director. The Board has since made Dr. O'Connell's appointment permanent.

1. Presented by Martin Andreas, Chair of the AARC Board and Senior VP at Archer Daniels Midland in Decatur, IL. Mr. Andreas is a member of a panel at the 1993 USDA Outlook Conference that is Entitled "Business Update on Farm-Based Industrial Products," December 2, 1992.

AARC's Operating Principle

The AARC Board concurs with a recent report issued by the National Academy of Science. The report, entitled The Government Role in Civilian Technology, found that private industry is better suited than public institutions to determine market winners. The report points out that cost sharing is one of the most effective ways to ensure that a project will achieve market success. We agree. While the level of costsharing may vary from project to project, the Board will give great weight to the level of financial resources involved in determining which projects to support.

The AARC concept is right for the times. With increasing international competition in the marketplace, public-private cooperation and partnerships are critical to the quick and effective movement of new technology from government and university laboratories to the marketplace. I firmly believe that the central operation principle of AARC must be cooperation with the private sector. In essence, AARC is a service organization dedicated to assisting private industry accelerate the development of economically viable new agriculturally-based products and materials.

Public Hearings

At the first meeting of the AARC Board we scheduled eight public hearings to obtain input before we contemplated policy and program decisions. These were held in Iowa, Georgia, New Jersey, Oregon, California,

Minnesota, Kansas, and Texas. The Board heard from more than 200 individuals and organizations. We heard from Commissioners of Agriculture, processors, manufacturers, farmers, entrepreneurs, farm organizations, commodity groups, cooperatives, foundations, universities, and state legislators.

The Board was impressed and encouraged by the enthusiasm of witnesses for the AARC approach. We were urged by many witnesses to take a leadership role, to make it happen, to help turn ideas into marketplace successes. The AARC Center has since adopted the motto "Make It Happen." We heard from witnesses that many rural economies need a economic "shot in the arm" and that new, industrial, non-food, and non-feed uses of agricultural materials can help provide that medicine. We heard repeatedly that the AARC Center should be a catalyst, a coordinator, and a facilitator for finding new industrial uses for traditional and new crops, animal by-products, and forestry materials. Some witnesses told the Board that more fundamental research is needed to support new product development and we believe that to be true. However, the majority of the witnesses identified pre-commercial demonstration and testing activities as the most critical area for AARC's focus.

We heard that new technology by itself does not assure market success. One individual, involved in the business of commercializing research, noted that in recent years knowing the changing market needs have been

five times as effective as technology development in launching successful new products or processes.

Themes that were replayed throughout the hearings included:

- Operate like a business;
- Maintain independence and avoid bureaucratic thinking;
- Keep the application process simple and minimize red tape;
- Leverage your resources; and
- See yourself as an economic development organization.

Request and Review of Proposals

We were mindful of the many suggestions as we developed the Request for Pre-Proposals announced on August 17 in the Federal Register. In addition, the AARC Center distributed the announcement to several publications and mailed it to over 2,000 individuals, including all who provided their names and addresses at our public hearings.

The closing date for submitting preproposals was October 30, 1992. Over 400 were received -- requesting over two hundred million dollars of assistance -- that will compete for the ten million dollars of available AARC center funds. The number of pre-proposals submitted demonstrates the

strong need for such assistance.

During November the pre-proposals have been going through a thorough review process in line with the enabling legislation and guidelines from the board. Three outside specialists with at least one with business experience and another with technical knowledge, plus the AARC center staff are reviewing each pre-proposal. After considering the comments of the reviewers and using their own judgement the AARC board will meet in mid-December to select the pre-proposals that best meet the established criteria. Full proposals will be requested from the successful pre-proposals before the AARC Board funds a project. Announcements of funded projects are expected by February, 1993.

Regional Centers

The public hearings documents strong interest in and support for regional centers. The Board believes that Regional Centers, if handled properly, can be a valuable asset in carrying out the mission of AARC. As your know, the fiscal year 1993 appropriation of \$7.25 million triggered the statutory requirement for establishing centers. At a recent meeting of the Board the regional center issue was discussed. After considerable discussion the Board agreed that a regional center must be proactive, results oriented, and a champion of agriculture and Rural America. Staff was directed to develop recommendations and evaluation for the Board to use

in selecting Regional Centers and monitoring their performance. A formal Request for Proposals for regional centers is under development and will be released soon.

Strategic Plan for AARC

To guide our actions and to carry out the total scope of the AARC program a strategic plan was prepared. As government plans go it is fairly short -- being only 10 pages long. It presents the beliefs and values of the AARC center along with goals and functions. Although funding of promising projects is a central focus of AARC, there are other necessary activities if Agriculture is to become a major provider of renewable materials for industrial markets.

1. Being a catalyst, facilitator and Coordinator

- this can be done by enhancing cooperation, building and rewarding teamwork and demonstrating the environmental advantageous of using renewable materials

2. Building Private/Public Partnerships

- breaking down the institutional and cultural barriers to joint development of promising technologies that produces jobs and economic activity in rural america

3. Information Exchange

- facilitate the collection and dissemination of information concerning new industrial uses of Agricultural and forestry materials

In Conclusion:

Many opportunities exist to expand new industrial uses for the renewable materials that can be produced on our farms and in our forests. We need to bring to bear science, technology, and "market sense" to identify and produce products in the most cost effective way possible, and identify and support product champions. Finally we need to encourage and facilitate cooperation and partnerships among government, universities, industry and agriculture. If we can accomplish these things, I believe that we can, "make it happen."

Thank you for inviting me to Agriculture Outlook 93 and being a member of the panel on "Farm Based Industrial Products."

Outlook '93

For Release: Tuesday, December 1, 1992

**NEW OILSEED PRODUCTS CAN MAKE MONEY
BUT IT AIN'T EASY****Frank L. Erickson
President of International Lubricants, Inc.**

I would like to thank Mark Dungan and the USDA for giving me this chance to speak about the opportunities and problems that exist for small entrepreneurial companies. The title of my speech was given to me by Dr. Dan Kugler of CSRS, I believe it is quite appropriate, "New Oilseed Products Can Make Money But It Ain't Easy," with a heavy emphasis on the ain't easy.

It is my opinion that small business in the United States has certain essential elements it must possess in order to have any chance of succeeding in these economic times. The more controlled the market the longer it takes for success. These elements include (not necessarily in order): 1.) Champion- This person cannot be driven by monetary compensation but have an alternative agenda, 2.) Source of seed capital and secondary funding-A nucleus of investors who are interested in longer term positions and not interested strictly on short term gains that so frequently plague U.S. industry (Japan is a good example of long range thinking), 3.) Supporting Cast-A group of people that are willing to forgo certain monetary compensation and long hours to reach a long term dream, 4.) Outside Support-This can come from government or some central structure that must play a roll to validate and protect the small enterprise from predators ie. large entrenched companies and legislation that makes it impossible to succeed. Note: Favorable capital gains tax law change would help effect small business dramatically. 5.) A quality product-product performance is critical in the selling process.

Case Study International Lubricants, Inc.- Historical.

International Lubricants, Inc. (ILI) was incorporated in November 1984. A small group of investors put some capital together to attempt to introduce a new product to the consumer market. This product was based on sperm oil replacements derived from jojoba oil. The Company was under capitalized and technology was basically non existent. The

combination of these two factors meant certain failure. An original partner also appropriated funds from financial institutions with forged documents unknown to the other principles involved.

By the end of 1986, ILI was embroiled in three lawsuits and was destined for certain failure. Fortunately, in 1987 I had the opportunity to meet a distinguished research chemist Dr. Phillip Landis. Dr. Landis had retired from Mobil Oil Corporation as manager of applied research. He gave ILI a new hope and potential with new novel derivatives made from jojoba oil. By the end of 1987, ILI applied for it's first patent and developed it's first four products.

In the beginning of 1988, ILI had depleted all of its capital resources. With new direction and hope, one investor and myself put together new funding which enabled ILI to introduce its first phase of products. The total amount raised exceeded \$600,000.00.

ILI utilized the money to purchase its packaging and blending equipment. The funds supplied the initial inventory as well as various other start up costs including legal expenses, patent fees and other expenses due to problems in previous years.

ILI Marketing Dilemma- In early 1988, ILI needed to determine how to sell its new technology. The logical approach would be to sell the existing additive manufacture to be used in their formulations, but the price point of these seed based linear liquid waxes are considerably more expensive than the materials they presently use being tallow (lard oil). Another possibility would be to sell small compounders but they also were less interested in more effective materials and are dependent on price and gimmicking.

In early 1988, ILI provided samples of its LUBEGARD ATF Supplement to GM Hydramatic Division to test in its 440 and 700 R4 transmissions. The company was aware of the problems that these transmissions were experiencing in the U.S. and overseas transmission with torque converter shudder and shift feel characteristics. In one week after receiving the Lubegard sample GM called requesting MSDS sheets. We felt this was odd for them to respond so quickly.

An additional two weeks passed and Hydramatic Division asked to speak to Dr. Phillip Landis. Dr. Landis spoke with a Hydramatic Division engineer and he was informed that Hydramatic saw not only a temperature of 55 degrees coming out of the torque converter in temperature decrease but a complete change in static torque characteristics. The

conversation ended with GM requesting Dr. Landis to go to Detroit and meet with Central Research Group. GM never called again but Ethyl Corporation ordered samples within two weeks of Dr. Landis's conversation. Hydramatic had evidently gotten the information they desired and did not return any phone calls after that. It was almost as if ILI fell off the face of the earth.

About a year and a half later ILI was contacted by Saturn Corporation (GM Division). They had used the product out of the aftermarket and had successfully used the product to correct a shudder problem in their newly developed transmission. Also the company received a phone call from a stock broker representing a GM Engineer (Saturn Division) interested in buying stock in ILI. Meanwhile, for six months Saturn kept asking questions until we were asked to come back to Saturn's headquarters.

Dr. Landis and I went to Saturn Headquarters and to our amazement our red bottles were all over the work benches. About six young engineers plus representatives from Borg Warner who manufacture their frictional materials were present to meet with us. After our visit to Saturn's headquarters and all ILI's cooperation no other contact or return phone call was ever made after our visit. Even with ILI's cooperation the Saturn group would not even return a phone call to explain what their findings were. Not hearing back from them I called the engineer who was interested in the stock at his home. I found out from him that they had changed the frictional materials to correct the problem. With two encounters with GM and still no cooperation in respect to ILI.

The lesson to be learned is that the major additive manufacturers and General Motors do not want certain materials utilized unless it is under their terms. The largest additive manufacturers Lubrizol, Paramines Division of Exxon, Ethyl Corporation, Shell Additives and Texaco Additive control 90% of the world additive market. Three of these companies Lubrizol, Paramines and Ethyl have offices in central research at General Motors. These three additive companies are the only approved Dexron (Trademark owned by GM for ATF fluids) additive manufacturers in the world.

The only alternative for ILI was to develop a central market around the professional transmission rebuild aftermarket. The rebuilders have a series of problems that are fluid related to overcome when rebuilding GM, Ford, Chrysler and any of the foreign transmissions. The market was definable as far as size giving ILI the opportunity to have success with a very limited marketing budget.

In the middle of 1988 ILI began marketing its LUBEGARD ATF Supplement to the Professional Transmission aftermarket. The plan called for a sampling on the west coast. This was a very difficult process, stopping at each transmission shop that could be identified in each town by an individual salesman. At first just a very few transmission shops would try the product and only as a last resort. The products corrected a multitude of transmission problems after rebuild such as torque converter shudder, clutch chatter, frees valve bodies and frees hung governors. These problems make it impossible for the rebuilder to deliver the vehicle and have a satisfied customer.

The transmission rebuilder is caught in a dilemma when a shifting problems develop. Whether to use LUBEGARD ATF Supplement to determine if it is a fluid related problem or attempt to disassemble the transmission and take the chance that it is fluid related and the same problem will still exist after he assembles it.

ILI was very fortunate to have the opportunity to make contact with the Cooperative State Research Service Group "CSRS" when it did in the spring of 1989. The CSRS awarded the company its initial co-operative grant to ILI in the summer of 1989. This grant gave ILI the initial co-op funding to attempt to qualify for a fully blended ATF fluid that would meet the specification under the Dexron qualification tests. This provided ILI with the ammunition it needed to put in place a marketing plan that would change the course of the company.

At that time ILI was a little unrealistic on what was required in the approval process. Automatic transmission fluids are the most complex of all fluid systems. For example, Ethyl Corporation spent a reported 13 million dollars for its approval. ILI spent \$133,000.00 and CSRS spent \$50,000.00. ILI successfully passed the thirteen elements of the Chemical Bench Test, the Vickers Vane Pump Test, HEFCAD and Mercon. The Turbo Hydra-matic Oxidation Test (THOT) was within a fraction of passing. The real problem arose when we attempted to pass the Shift-Feel. We determined that the friction modifier and VI improvers had been pre-sheared by other approved suppliers to pass. In other words, making a candidate oil perform as if it had been in the transmission for a break in period and acting as a used fluid in frictional characteristics. This requires special equipment that ILI does not possess. These characteristics create most of the problems in the aftermarket. Hence a new marketing approach was developed.

ILI's marketing was progressing nicely until Ethyl Corporation gave a presentation at the national Trans Expo convention on adding supplemental fluids to Dexron approved fluids. At the time ILI did not understand why Ethyl had done this without contacting the company first. In retrospect, I believe that Ethyl and General Motors decided that it was in their best interest to attempt to discredit ILI because of the sales gains that were being made in the field.

ILI's technology in the Lubegard supplement is based on Phosphorous and sulfur technology as is Ethyl but ILI utilizes seed based fatty acids that are C24 compared to Ethyl's C18-20 from tallow (pig fat).

With the help of CSRS ILI decided that we needed our supplement tested at either Southwest Research Institute or EG&G. It was during these tests at Southwest Research Institute that dramatic differences were in fact found when LUBEGARD ATF Supplement was added to GM factory fill the reference oil for Dexron approval. One ounce of Lubegard ATF Supplement was added to one quart GM factory fill resulting in the wear reduction in excess of 60%, the Thermal and Oxidation Stability to dramatically increased and the shift performance improved by bringing the static torque (load carrying) and dynamic torque (power capacity) together.

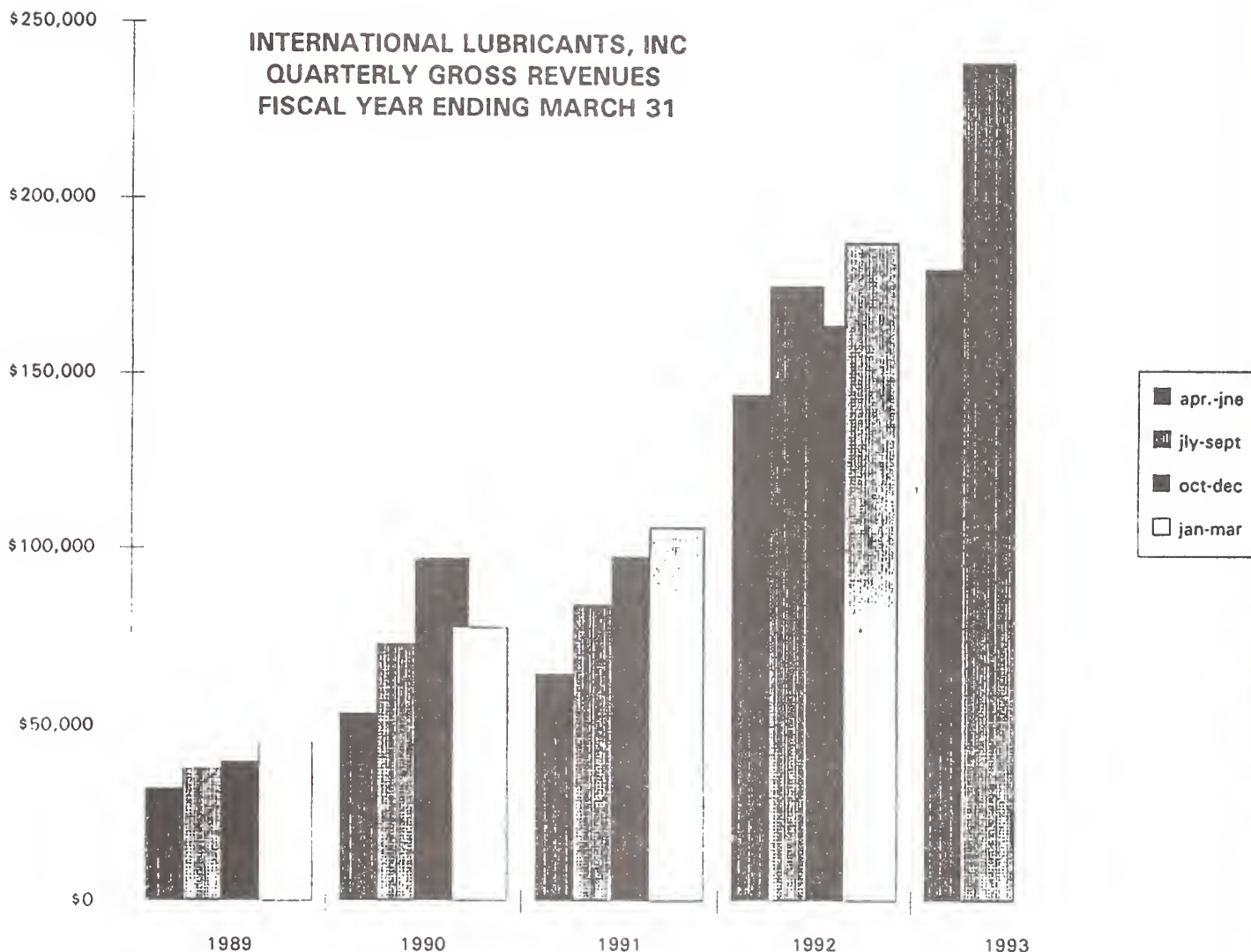
Ethyl Corporation's one test was supposedly performed on their HEFCAD Bench Stand in 1989, according to Pat Borrows from EG&G, the machine was not functioning properly due to a change over from asbestos to paper frictional materials. All fluids tested on this machine did not run to completion including Ethyls. He repaired this unit sometime in early 1990. As you can see, if this test was allowed to stand ILI's sales would have been hurt and possibly could have removed the company from its central market where much our limited resources had been put. This is an example of predatory problems that face small industry everyday in todays world.

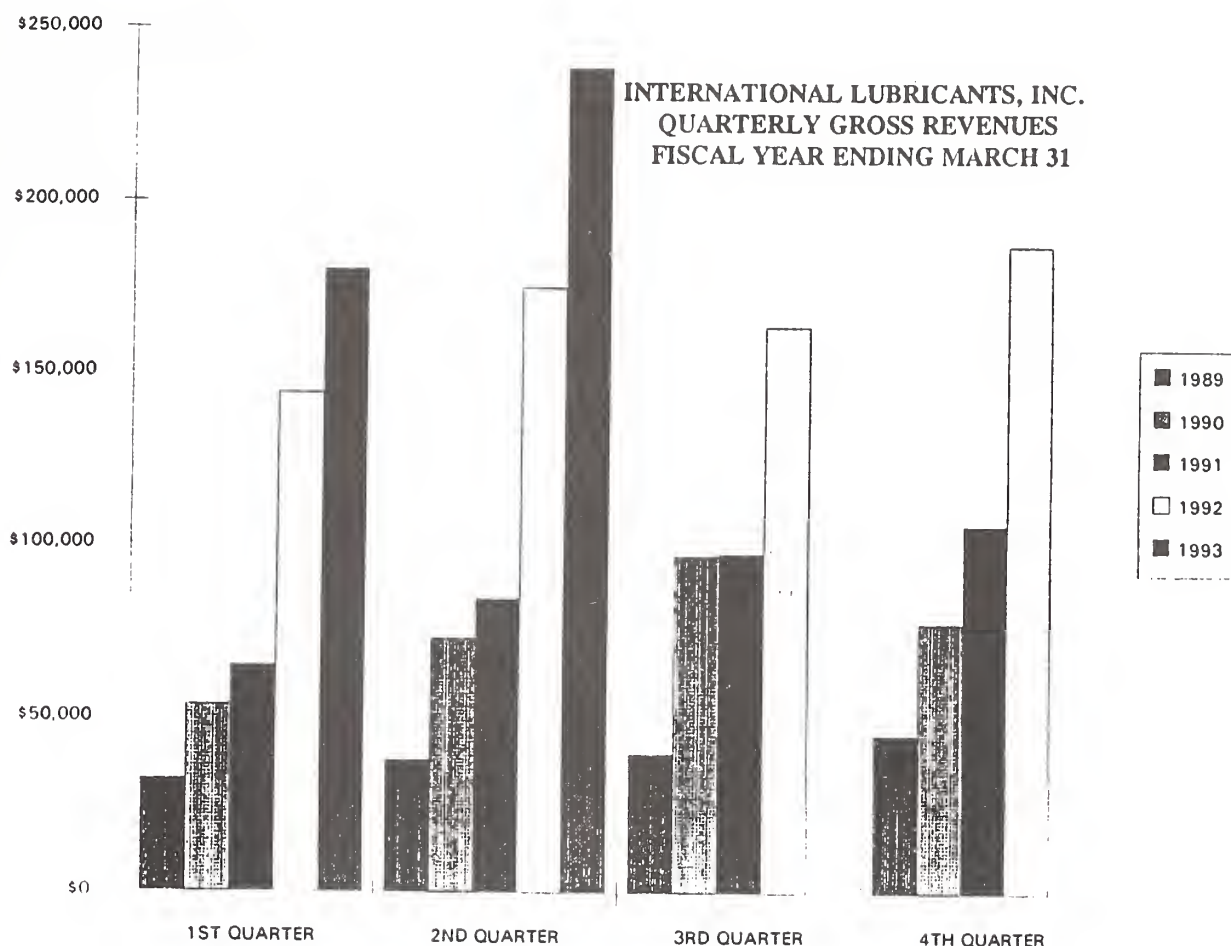
By CSRS assistance ILI lived to see its future grow. Additional co-operative research grants from CSRS have made it possible for ILI to test and develop other products that have the same beneficial characteristics as the transmission product such as: Tractor Hydraulic Transmissions Supplements, Gear Fluid Supplements, Water Soluble Coolants and other industrial applied products.

The CSRS group has helped ILI in many, many ways not just financially.

1. Co-operative Research Funding.
2. Technical Research Input.
3. Corporate Credibility.
4. Management Input.

Sales of ILI products have been increasing at a 75% compound growth rate for the last five years and presently the company will have its first profitable year. The Lubegard ATF Supplement is the largest selling product of its kind used by the professional rebuilders. ILI has 250 points of distribution in the U.S. and Canada and is now being exported to Europe and the Far East. The attached graphs give pictorial look at the sales growth of International Lubricants, Inc. since marketing began in fiscal year 1989.





Future Outlook

Dr. Phillip Landis and others efforts have developed some of the most exciting new seed oil technology ever, ILI will be bringing these products to market in the next year. ILI's second phase technology is a new feed stock made from a combination of seed oils with potential applications in not only lubrication but in paints, coatings and plastics. This material makes it possible to thicken and crossgrade seed oil based lubricants. The first product will be a multigrade gear oil made entirely from seed oil.

Total industrial fluid systems (hydraulic, way lubricants, coolants, etc.) from these seed oil materials, making it theoretically possible for bioremediation of the total waste stream in industry.

Finally, I would like to conclude that all this is not possible without small business to force a change. Again the elements of small business: 1.) Champion, 2.) Source of Seed and Secondary Capital, 3.) Supporting Cast and 4.) Government or some central organization help 5.) A quality product.

Outlook '93

For Release: Wednesday, December 2, 1992

THE ECONOMICS OF NEW INDUSTRIAL USES

E. Douglas Beach
Agricultural Economist, Economic Research Service
U.S. Department of Agriculture

Executive Summary

I appreciate the opportunity to talk with you this afternoon about the Federal government's role in commercializing new nonfeed and nonfood uses of agricultural commodities.

In the remaining fifteen to twenty minutes I will:

1. provide a brief history of "new" nonfood and nonfeed uses of agricultural products. I will also show that many of these uses are not new at all, but the degree of action and the opportunities for success are new;
2. suggest that government support of commercial research and development must be based on the argument that private industry, acting in response to market incentives, will underinvest. There are basically four reasons why private industry may underinvest - problems with property rights, externalities, benefits localized in the public sector, and financial market/time preference considerations; and
3. outline the Federal government's response to new industrial uses.

A. Brief History

In the January 1927 edition of *Farm & Fireside* Journalist Wheeler McMillen wrote:

"... Some of these days--not yet, but in time--you may run your own tractor and automobile with your own grain and potatoes, paint your buildings with your own soybeans, read magazines and newspapers printed on your own cornstalks and straw, and listen through radio horns and telephone receivers made out of your own corncobs and oat hulls."

McMillen argued that using raw materials from agriculture as a feedstock for industry would improve economic conditions in rural America. His diligence, along with some financial aid from Henry Ford, led to the formation of the Chemurgic Council in 1935. The Chemurgic Council had three primary aims:

- develop new nonfood uses for established farm crops;
- establish new crops for new or old uses; and
- discover profitable uses for agricultural wastes and residues.

The development of new uses for agricultural and forestry materials has also had a long history of Federal government support. In 1938, four USDA Regional Research Laboratories were created at Albany, California; New Orleans, Louisiana; Peoria, Illinois; and Wyndmoor, Pennsylvania. Their mission was and is to find new uses for farm products and to develop new products and materials. Over the years, this has included the development of water-based paints, plywood glues, animal fat detergents, lubricants and cutting oils, permanent press fabrics, and a low-cost method to produce penicillin.

More recently, during the Reagan administration, Secretary of Agriculture Block held a national "Challenge Forum" on new uses. Also, Secretary Madigan's "Vision For the Future" includes a strong commitment to research, develop, and commercialize new nonfeed and nonfood uses of agricultural commodities. He believes that U.S. agriculture must capitalize on recent market opportunities presented by the increased demand for environmentally friendly, safe-to-handle products. Madigan also believes the development of these markets will enhance the economic vitality of American agriculture.

Table 1 provides a brief listing of agricultural crops which have direct applications as industrial feedstocks. As you can see, McMillen's predictions

Table 1. Examples of Crops and New Uses.

SOURCE	PRIMARY PRODUCTS	CURRENT USES	POTENTIAL NEW &/OR HIGHER-VALUE USES
Animal Fats Vegetable oils	Fuels	Diesel fuel	Bus and equipment fuel for clean air attainment
Starch crops, primarily corn	Fuel and octane additive	Mixed 1:10 with gas	Increased use in gasohol, ETBE octane-enhancer
Forest products	Composite materials, chemicals	Tanning agents, adhesives, alcohol	Wide range of chemicals, plastics, synthetic rubber
Kenaf	Short and long fibers,	Poultry litter, specialty paper	Newsprint, paper products, composite materials
Livestock by-products	Hides, fat, bone and blood	Medicines, sutures, films	Plastics, medicines, photographic film, industrial chemicals
Starch and protein from crops	Biodegradable polymers	Limited use in degradable polymers	Extensive use in new high-performance polymers

are not too far from our current productive capabilities. Table 1 also shows that if these new uses are economically, politically, and socially viable, then

agriculture can play an important role in the industrial evolution of the United States, and possibly the world.

B. Government Involvement in "New Use" Commercialization

Since the 1940's, private and public research in agricultural production has helped reduce labor requirements by 75 percent and increase productivity by 230 percent. Surveys on the profitability of agricultural research and development (R&D) indicate rates of return ranging from 10 to 100 percent. Federal, state, and local governments have played an integral role in funding agricultural research and in bringing new technologies to farmers. However, as shown in Table 2, the government share of agricultural R&D has decreased from roughly 50 percent in the 1960's and 1970's to less than 45 percent in the 1980's.

Table 2. Funding Sources for Agricultural R&D.

	Public Research	Industry Input Research	Industry Food Research	Total
Million 1980 dollars category share in parentheses				
1960	657 (50%)	381 (29%)	279 (21%)	1,317
1965	856 (51%)	475 (29%)	324 (20%)	1,655
1970	930 (50%)	527 (29%)	379 (21%)	1,836
1975	1022 (50%)	618 (31%)	373 (19%)	2,013
1980	1186 (45%)	938 (36%)	508 (19%)	2,632
1985	1182 (41%)	973 (34%)	707 (25%)	2,862
1989	1373 (43%)	1068 (34%)	738 (23%)	3,179

As budgets get tighter at all levels of government, public agricultural research systems are being asked to do more with less. A related issue is whether traditional government models, which generally fund basic and applied research, often to the exclusion of commercialization, deliver the most "bang for the buck." This is especially important in new use applications to industry.

There are generally five stages in commercial R&D:

- BASIC RESEARCH - examines fundamental laws and properties of nature without regard to practical application or results;
- APPLIED RESEARCH - targets specific applications and may involve experiments designed to evaluate potential practical benefits;
- DEVELOPMENT - moves closer to practical application, and is usually conducted with larger equipment and facilities (e.g., a pilot plant for a new product);
- DEMONSTRATION - establishes the economic and technical feasibility of a product or process; and
- ADOPTION: when a private and/or public organization uses the new technology on a commercial scale.

As mentioned earlier, traditional U.S. policies have supported the first three stages of commercial R&D and generally ignored the last two. Daniel F. Burton, Jr., the executive vice president of the Council on Competitiveness (a private, nonprofit advocacy organization comprised of 150 CEO's from industry, academia, and labor) believes our bias for research and development and general neglect of demonstration and adoption may explain why U.S. firms lag behind some German and Japanese competitors in the rate of adoption and the intensity of utilization of new technologies. In comparison, Japan and Europe support demonstration and adoption by promoting partnerships between business, universities, and government "downstream" from basic and applied research.

Nevertheless, not all collective research efforts in Japan and Europe, particularly those subsidized by the central government, have been successful. For example, despite years of effort, Japan has failed to gain a major foothold in the U.S.-dominated pharmaceutical industry. And, similarly, Europe's heavily subsidized electronics industry has failed to close the gap with the United States. Therefore, "heavy-handed industrial policy," where the government picks technological winners and losers, is not the answer. The challenge is to develop programs that on the one hand, keep the government from picking technological winners and losers; but, on the other hand, promote financial support of economically efficient R&D.

Government support of commercial R&D must be based on the argument that private industry, acting in response to market incentives, will underinvest. Private investors rationally consider their own (private) benefits and costs when deciding on R&D investment. Thus, private sector underinvestment, from a national viewpoint, can occur when:

- a. an individual cannot appropriate all of the benefits from his/her R&D investments because others can free-ride on the public goods produced as a result of the initial R&D (e.g., a firm building the first commercial-scale plant will go through a "learning by doing" period that, unless kept secret, will benefit competitors);

- b. an individual's production or consumption activities impact another person's production or consumption and those impacts are not compensated through a market transaction (e.g., the effects of plastic waste on the environment);
- c. the benefits of the R&D are localized in the public sector (e.g., biodegradable polymers from corn starch and the Federal corn commodity program); and
- d. firms may value near-term payoffs more highly than society and society may value longer-term payoffs more highly than firms, thus leading to an underinvestment in activities that take a relatively long time to pay off.

B.1. Appropriability

It is when R&D involves the promise of useful new knowledge that is generic in nature, with wide applications across economic activities that appropriability is an issue. Generally, private goods can be sold commercially and the benefits from their sale are captured by those who own the associated property rights or patents. In agriculture, this would include hybrid seeds in which it is necessary to purchase new seed each time a crop is planted.

In comparison, collective goods do not lend themselves to profitable merchandising, even though there may be significant gains to society. An example, in a new uses context, may include the development of new wheat varieties for specific industrial applications - such as biodegradable polymers. Because wheat is a self-pollinated plant, once a new variety is released, growers can retain a portion of their harvest and use it as seed for planting in subsequent years. As a result, private firms cannot capture all of the benefits of producing new wheat varieties. This leads to suboptimal levels in both R&D and production.

B.2. Environmental Externalities

A second reason firms may underinvest in commercial R&D is due to an environmental externality. The crucial feature of an externality is that there are goods people care about which are not sold in markets. For instance, there is no market for pesticide leachate, nor is there a market for environmentally sound farming practices. It is this lack of a definable market which requires government action.

In a new uses context, consider the market for biodegradable polymers. Over the last 30 years, annual growth in plastic production has averaged 10 percent; far greater than the annual growth in the overall economy. Unfortunately, increased plastic use has resulted in increased plastic wastes. In a 1990 Environmental Protection Agency report, the Agency was primarily concerned with the impact of plastic waste on solid waste management and on the marine environment. Currently, plastics account for approximately 7 percent by weight and 14-21 percent by volume of the municipal solid waste stream.

Plastic waste in the marine environment pose risks to marine life, human life, and aesthetic appearance. The Marpol Treaty, signed in 1987 by 29 countries including the United States, prohibits the discharge of all plastic wastes at sea beginning in 1988 for commercial vessels and in 1994 for government ships. In an effort to adhere to the treaty, the U.S. Army--in conjunction with the USDA and private companies--has implemented a large-scale research effort designed to develop biodegradable polymers to replace petroleum-based plastics for all food uses. Many of these polymers are being made from corn, wheat, and potato starch. The advantage of these polymers is that they are fully degradable. However, starch-based polymers generally cost 4 to 10 times more than petroleum-based plastics.

In the case of a negative externality, the price system gives consumers too little information. Specifically, the price consumers pay for petroleum-based plastics does not incorporate the disposal, environmental, and other costs associated with plastic use. Consequently, from an economic and social perspective, we consume too much plastic.

In theory, government should increase the price of plastics to include or internalize the disposal, environmental, and other consumer costs associated with plastic use. In reality, the best the government can generally do is to achieve a politically determined level of environmental quality at the least cost. Often this objective can be achieved with taxes. In those instances when policymakers are reluctant to increase taxes, an environmental externality can act as a barrier to entry for more "environmentally friendly" products, like starch-based polymers.

B.3. Public Sector Benefits

The third reason government may intercede in the development of new-use products is that demand-creating innovations can reduce the social costs of farm-income-support policies. Economists have shown that a technological breakthrough in the production, for example, of starch-based polymers would increase market demand for corn or wheat and reduce program payments, without affecting total farm income. Because farm production would not change due to the technological breakthrough, total returns to producers are unchanged; thus, farmers have no incentive to fund demand-creating research. In comparison, the government has a significant incentive, because demand-creating R&D would reduce the costs of farm income support programs.

Similarly, innovations in the development and use of new crops that are economically viable alternatives to program crops could also reduce the costs of farm-income-support programs. The development of economically viable new crops which compete for program acres, excluding those acres in the conservation reserve program, would reduce the number of acres used to produce program crops. In turn, a reduction in program acres would decrease the output of program crops and reduce government support payments.

B.4. Financial Market Considerations

The final argument why firms underinvest in commercial R&D is that firms may value near-term payoffs more highly than society, and society may value longer-term payoffs more highly than firms; thus, leading to an underinvestment in activities that take a relatively long time to pay off. Also, banks and other financial institutions may be unwilling to finance commercialization because of the risks involved.

It is possible that, when financial markets match-up savers and investors thus setting interest rates, the resulting value is higher than the rate that would maximize social welfare. But, this has not been shown empirically and economists disagree on the veracity of this point. In addition, the industrial structure and corporate ownership patterns in the United States tend to support investments with high short-term payoffs relative to the economies of Japan and Germany. This is not the often-heard argument that U.S. financial markets are inefficient, rather its an argument that traditional business practices in Europe and Japan may favor longer-term investment relative to the United States.

There is some evidence the funding rate of pre-commercial R&D in Japan and the EC may be higher than in the United States. For example, through efforts like the MITI and Key Technologies programs, Japan has promoted partnerships between business, universities, and government "downstream" from basic research. Manufacturing extension services, capital subsidies, accelerated depreciation, as well as direct subsidies, have been used to promote technology development and the diffusion of new technologies into specific firms and industries. Similarly, the European Community has promoted collaborative R&D under the Framework Program. The Framework Program is scheduled to allocate \$2.1 billion per year between 1990 and 1994.

In comparison, government-induced structural barriers -- differences in standard business practices -- may limit investment in pre-commercial R&D in the U.S. For example:

- capital gains of Japanese insurance companies must, by law, be reinvested in the company producing the gain;
- pension funds in Germany are customarily invested only in the stock of the employer company. This practice not only increases the amount of capital available to the company but also increases the financial stake of employees;
- accounting practices in Germany and Japan count investment R&D, employee training, and other similar expenses as capital, not as operating costs as is commonly practiced in the U.S. These practices reflect a longer-term orientation for German and Japanese government and business as compared to the United States; and
- laws in the U.S. keep ownership of banks and nonfinancial corporations separate, thus, requiring higher short-run payoffs to repay loans.

The U.S. must develop programs that on the one hand, keep the government from picking technological winners and losers; but, on the other hand, promote financial support for all R&D activities which are economically efficient.

An example in which financial markets may constrain the development of a "new use" agricultural product is kenaf. Kenaf is a non-wood, fiber crop which is especially attractive for manufacturing newsprint and other fiber-based products. For example, commercial-scale tests have shown that paper derived from kenaf is stronger, whiter, capable of sharper photo reproduction, and more user-friendly due to better ink adherence, than wood-pulp derived newsprint. Furthermore, the energy consumption to pulp kenaf is 15 to 25 percent lower than that required to pulp southern pine, and with fewer wastewater problems.

Because kenaf is bulky (low bulk density), transportation costs can make it non-competitive with wood for pulp and paper making. Consequently, intermediate or final value-added processing should occur near kenaf production fields. As a result, the economics of developing products, like kenaf, for industrial uses is a Catch-22. Farmers aren't likely to produce a new crop without an assured market, and industry isn't likely to retool, or in this case relocate, to process an alternative crop without an assured supply.

Given the start-up costs associated with the development of a new product and the availability of imported newsprint, banks have been unwilling to devote resources to kenaf production or kenaf processing. For that reason, in 1986 USDA's Cooperative State Research Service/Office of Agricultural Materials initiated a three phase program to commercialize kenaf. Phase I and II examine the agronomic issues of kenaf production and pulping, and Phase III involves commercial scale production of kenaf-based newsprint. Phase III is to be funded and carried out solely in the private sector. Over the last six years, the government has spent over \$500,000 to commercialize kenaf and industry has spent over \$700,000. Therefore, kenaf is a good example of the extended period of time and type of private-public partnerships often necessary to commercialize "new use" products.

C. The Federal Government Response

As Dr. Kugler expressed in an earlier speech, we are talking about doing things which create a demand driven need for a product and a derived demand for the agricultural sector to produce the crop. The Federal government is using several approaches to create this demand. There are currently six programs and two initiatives in various stages of development.

C.1. Programs in Progress

The first program involves the Technology Transfer Act of 1986 (Public Law 99-502). Under this Act, Federal laboratory researchers are encouraged to interact more extensively with industry. This includes cooperative research and development agreements or CRADA's and the TECH TRAN database which is available to industry and lists all government lab research.

Since 1986, scientists at the USDA have established over 250 CRADA's with various companies to commercialize technology arising from their research. This is the most among all sectors of the government. Furthermore, USDA efforts under the Technology Transfer Act have included many market successes like "Super Slurper," a highly absorbent starch polymer used in fuel filters, starch-encapsulated

pesticides to increase herbicide efficacy and decrease runoff, and enzymes to dispose of leather tanning wastes.

Another program, mentioned earlier by Mr. Andreas, is the Alternative Agricultural Research and Commercialization (AARC) Center. Under Title XVI, Subtitle G, of the 1990 Farm Bill, Congress provided support for pre-commercial development of nonfood and nonfeed uses of agricultural commodities. The stated purpose of Subtitle G is:

- to develop and produce marketable products other than food, feed, or traditional forest or fiber products;
- to commercialize new non-food, non-feed uses ... to create jobs, enhance the economic development of the rural economy, and diversify markets; and
- to direct ... research and commercialization efforts toward ... agricultural commodities that can be raised by family-sized agricultural producers.

Fulfillment of Subtitle G is to be directed by the AARC Center.

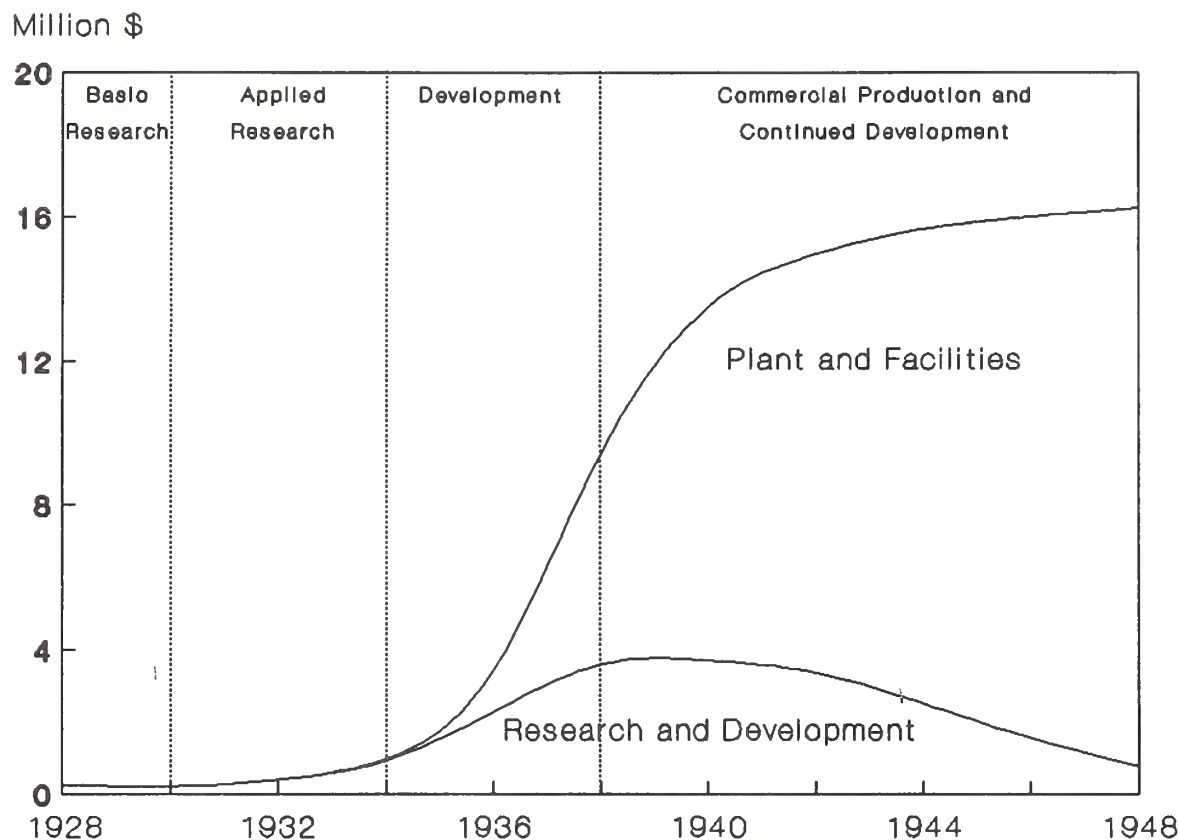
Dr. Davis Clements, former chairman of the Department of Chemical Engineering at the University of Nebraska-Lincoln and Director of the Office of Agricultural Materials/CSRS, points out that during precommercial R&D, risk tends to decrease from basic research through demonstration, but costs tend to increase. Clements' assertion is supported in Figure 1.

In Figure 1, DuPont's annual expenditures to develop nylon increased dramatically from the basic and applied research stages through the development and commercial production stages. Clements and others assert that often there is a funding gap at the point where technologies are brought out of the laboratory but are not ready for commercial prototyping. It is at this point - when the technology has not been demonstrated in commercial practice and must be moved from one organization to another - that technology transfer often fails. The AARC Center is especially situated to help private industry bridge the funding gap between development and commercialization, and to bring "new use" commercial technologies to the marketplace.

The third program is a joint effort between the USDA and the Department of Energy to develop a Situation and Outlook (S&O) Report for industrial uses of agricultural materials, highlighting new uses. The goal of the report is to supply relevant economic intelligence to people involved in the research, development, production, processing, marketing, and policy aspects of taking agricultural materials from the farmgate through the industrial marketplace. Current trends and new projects will be covered, but the goal is to use more rigorous analysis, evaluation, and forecasting techniques to provide researchers and decisionmakers with the economic intelligence needed to develop industrial uses for agricultural materials.

The S&O report will focus on industrial uses of agricultural materials, as well as their major substitutes and complements, in seven categories: starches & carbohydrates, fats & oils, fibers, animal by-products, forest products, natural

Figure 1. Dupont's Annual Expenditure to Develop Nylon



plant products, and natural rubber & resins. Industrial uses of both new and traditional agricultural outputs will be covered under each category. Special articles will provide in-depth analyses of particular uses and related markets.

The fourth program is being implemented by the CSRS Office of Agricultural Materials. The office emphasizes work to expand uses of industrial products and new crops beyond the "farm gate." Current programs include lubricants, polymers, coatings and specialty chemicals from vegetable oils, development of fatty acid resources; biodegradable polymers from starch and proteins; natural rubber and other polymers from guayule; newsprint, bond paper and other fiber crops from kenaf; and thermally insulating textiles from milkweed.

Projects are operated through cooperative agreements and grants to meet specific national needs and to use domestic resources more effectively. Work is conducted through both private and public institutions, generally with a multi-disciplinary team of experts and almost always with financial contributions by partners.

The fifth program is a study being conducted by the National Research Council of the National Academy of Sciences. The objective of this program is to address

key aspects of research and commercialization of biobased products derived from agricultural and forestry resources. A committee of twelve experts will address future opportunities for biobased products as a result of recent advances in biotechnology and in the chemical and materials sciences. The committee will generate a final report intended to provide an authoritative perspective on biobased products as well as providing much-needed guidance for future action. The report is expected in 1994 and is funded by the Department of Energy, USDA, Department of Defense, and National Science Foundation.

The final program, which has already been completed, is a report by the Office of Science and Technology Policy; Federal Coordinating Council for Science, Engineering and Technology; Committee on Industry and Technology; Department of Commerce. The report addresses technologies in 10 categories for which materials R&D can contribute to resolving problems and improving applications cost-effectively. The opportunities are discussed in the context of the sector or applications category that would be the principal beneficiary of any advancement. Included are applications that would benefit the Departments of Energy, Transportation, Health and Human Services, Agriculture, and the Interior. Also included are applications that would benefit the Environmental Protection Agency, National Aeronautics and Space Administration, and National Science Foundation.

C.2. Initiatives Under Consideration

In addition to these six programs, there are currently two draft initiatives being considered at the USDA: the "New Uses Initiative" and the "Biofuels Initiative." An Initiative reflects the Secretary's vision for agriculture and determines how the Department will support that vision.

As it is currently written, the goals of the "New Uses Initiative" include:

- developing new economically competitive technologies and products from agricultural and forestry materials;
- developing new crops to generate renewable industrial feedstocks that are not produced domestically;
- developing new technologies and products that maximize the environmental advantages of renewable feedstocks; and
- maximizing the benefits of new markets to rural businesses and communities.

The specific objectives of the "Biofuels Initiative" include:

- increasing the efficiency of converting biomass to liquid fuels;
- improving and expanding the feedstocks available for conversion to liquid fuels; and

- expanding market opportunities for biofuels through the development of engine technology and fuel formulations that maximize the environmental and technical benefits of biofuels.

D. Conclusion

I would like to reiterate the three major points of my presentation:

1. "new" nonfood and nonfeed uses of agricultural products are not new, but the degree of action and the opportunities for success are new;
2. government support of commercial research and development must be based on the argument that private industry, acting in response to market incentives, will underinvest; and
3. federal government response to new uses includes research, CRADA's, and TECH TRAN activities at the Agricultural Research Service; development and commercialization projects at the Alternative Agricultural Research and Commercialization Center; a Situation and Outlook Report at the USDA with funding and cooperation from the Department of Energy; various industry-university-government partnerships sponsored by the Office of Agricultural Materials/Cooperative State Research Service; predictions on the future of biobased products from the National Research Council/National Academy of Sciences; a report, by the Office of Science and Technology Policy/Department of Commerce, addressing technologies in 10 categories for which materials R&D can contribute to resolving problems and improving applications for new industrial uses; and two draft USDA initiatives.

Outlook '93

For Release: Wednesday, December 2, 1992

THE EFFECT OF ECONOMIC STRESS ON FAMILY STRUCTURE

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Introduction

The 1980's was a period of economic hardship for many nonmetro areas. Recession, industrial restructuring, and the farm crisis meant lower growth in income and employment and higher rates of unemployment, poverty, and underemployment in nonmetro areas relative to metro areas (Lichter, 1991). At the same time, nonmetro family structure patterns began to converge with those of metro areas. The share of traditional families (a married couple with children), still the norm in nonmetro areas, began to decline. Nontraditional family forms, such as mother-only families, rose. Although the share of mother-only families is still smaller in nonmetro than in metro areas, the rate of increase in such families over the past decade was faster in nonmetro areas (Swanson and Dacquel, 1991). These changes in nonmetro family structure are probably related to the severe economic stress that these areas suffered during the 1980s as well as changing social values.

The increase in the number of mother-only families presents a serious problem because of their much higher risk of poverty. Lichter and Eggebeen (1992) have cited the change in nonmetro family structure as a major contributor to the increase in child poverty in the past decade. They also found that nonmetro children living in female-headed families were more likely to live in poverty than their metro counterparts.

Research done on the economic status of minority families found that nonmetro minorities suffered much higher real median family income loss and increased poverty rates from 1979 to 1986 than metro minorities (Jensen and Tienda, 1989). Female-headed families were especially common among minorities in nonmetro areas (Swanson and Dacquel, 1991).

In this study we explore the relationship between the structure of a family and its economic status, and the influence of nonmetro and regional residence on this relationship.

Measures of Family Structure

By Census definition, a family household consists of a householder and one or more persons living in the same household who are related to the householder by birth, marriage or adoption. We analyzed both nuclear and extended family structures within family households, and we looked only at families with children under 18 years of age.

Nuclear Families

The most common measures of family structure focus on the nuclear family. Nuclear families may be headed by either a married couple, a woman without a husband present, or a man without a wife present. Combining the latter two categories gives a measure of single-parent families, a category that has increased by more than half in the last decade, totalling more than 10 million families by 1991 (table 1). Fully 87 percent of these single-parent families are headed by women.

The focus for nuclear family structure in our analysis is on female-headed families, including all families living in a multiple-family household. In the 1980s, the percentage of mother-only families increased faster in nonmetro areas, by nearly 40 percent, than in metro areas where the rate of increase was about 30 percent. By 1991, nonmetro areas lagged very little behind metro areas in the percentage of all families that were headed by women (23 versus 26 percent, respectively).

Extended Families

The head of a family household is also the head of the household's primary family, and all other families in the household are considered sub-families. A growing proportion of all families are living as a sub-family. Though still fairly small, the proportion of sub-families has about doubled in the last decade, reaching seven percent in 1991 (table 2).

More than three-fourths of all sub-families are related sub-families, having a member who is related by blood, adoption, or marriage to the head of the primary family. Our measure of the extent of extended family structure is the proportion of families living as related sub-families.

The increase in related sub-families has been slightly greater in metro than in nonmetro areas during the past decade. In 1991, metro and nonmetro areas showed similar percentages of families living as related sub-families (6 and 5 percent, respectively).

High Proportion of Related Sub-families are Headed by Women

Our nuclear family structure measure, the proportion of female-headed families, and our extended family structure measure, the proportion of related sub-families, are related to economic stress, as will be shown later in the paper. The creation of a female-headed family through divorce or postponement of marriage may in part be due to economic problems. The poor economic status of female-headed families, however, indicates that female-headedness is also the cause of economic stress for family members. The creation of sub-

families, i.e., doubling up with another family may be a solution to economic problems, at least for the sub-family. This undoubtedly why a strong relationship exists between living as a related sub-family and being a female-headed family. Nearly three-fourths of nonmetro related sub-families were headed by women in 1991, and the percentage is similarly high in metro areas (fig. 1). Single-parent families headed by men are the least common type of related sub-family.

Family Structure by Race and Residence

Female-headed families and related sub-families are far more prevalent among Blacks than Whites and, for both races, somewhat more prevalent in metro than nonmetro areas. In 1991, Black families were three times more likely to be headed by women than White families in metro areas, and four time more likely in nonmetro areas. Black families were also three times more likely to be living as a related sub-family White families in metro areas and five time more likely in nonmetro areas. Clearly, racial differences in family structure are intensified by nonmetro residence.

Since a high proportion of U.S. Blacks, particularly nonmetro Blacks, live in the South, we examined family structure by region to determine the extent of regional influence on racial differences. We found little difference between the South and the rest of the country among metro families. However, among nonmetro families, the proportion of related sub-families and the proportion of families headed by women was higher in the South.

Nonmetro regional breakdowns were separated by race. Among nonmetro White families, those in the South were only slightly more likely to live as either a related sub-family or to be headed by a woman, showing a fairly small South/non-South effect. Within the nonmetro South, Black families were three times as likely as White families to be living as related subfamilies, and nearly four times as likely as White families to be headed by a woman. Thus, the regional effect alone appears to play a small role in the family structure of nonmetro Blacks.

Family Structure and Economic Stress Within the Family

Unemployment

Female-headed families and sub-families are at a higher risk of unemployment than other types of families. Nonmetro residence intensifies this risk somewhat. In 1991, the heads of female-headed families were twice as likely to be unemployed full or part-time as heads of married couple families in both metro and nonmetro areas (fig. 2). Similarly, the heads of related sub-families were more than twice as likely to be unemployed as heads of primary families, with the unemployment rate of sub-family heads at 18 percent in nonmetro areas (fig. 3).

Poverty

The same patterns of higher risk for female-headed families and sub-families exist for poverty, and are intensified by nonmetro residence. Nearly half of

all female-headed families in nonmetro areas are poor, more than four times the poverty rate for nonmetro married couple families, and 7 percentage points higher than for female-headed families in metro areas (fig. 4).

Related sub-families, regardless of headship, are also likely to be poor. Using the sub-families own income only, we found that nearly two-thirds of nonmetro sub-families would be living in poverty if they had access to only their own income. Metro sub-families would also have a high rate of poverty if they were living on their own, at 60 percent, although not as high as for their nonmetro counterparts (fig. 5).

Doubling up with another family is likely to help the economic status of a sub-family, but for a substantial portion of poor sub-families, particularly those in nonmetro areas, the strategy of moving in with another family was not sufficient to escape poverty. Adding their primary family's income to their own helped lift about two-thirds of related sub-families out of poverty in metro areas, while in nonmetro areas, the percentage was just over half. Even after adding the primary and sub-family's income together, 20 percent of related sub-families in metro areas and 29 percent in nonmetro areas were still below the poverty line.

The Geography of Nonmetro Family Structure

The strong relationship between female-headed family status and sub-family status can be illustrated geographically. Using 1990 Census data we calculated two measures of family status for each nonmetro county. The first was the percentage of all families with children that were female-headed and the second was the percentage of all families with children that were living as sub-families. We then mapped each measure for nonmetro counties only (metro counties are shown in white).

The nonmetro county-level map (fig. 6) of the percentage of female-headed families shows the highest levels colored in black in the Black Belt, the Mississippi Delta, and scattered throughout the areas of North Dakota and South Dakota that have high concentrations of American Indian population. The percentage in these counties was two standard deviations above the nonmetro mean of 19 percent. Those counties above the average, but not at the highest level (colored dark grey), are concentrated in the coastal South, Arizona, New Mexico, California, Alaska, and Hawaii, and scattered throughout southern Texas.

The map of the percentage of sub-families is shown in figure 7. The average for all counties is 5.4 percent. Geographic patterns of high concentration of sub-families are similar to those of female-headed families, and also include western Alaska, parts of Arizona, New Mexico and the southern tip of Texas in the highest category. Above average concentrations of sub-families appear more thickly throughout the South Atlantic and South Central regions than did female-headed families.

All of the above average areas for both family structure measures are notable

for their poor economic condition. Counties with the highest level of concentration have the additional characteristic of having a large minority population. Most notable in this regard are the Black Belt, the Mississippi Delta, southwest Texas, and Indian reservations in the Dakotas, Arizona, and New Mexico.

Conclusions

Unemployment and poverty have a clear relationship with family structure. And yet that is not the whole story. How minority status influences family structure independent of local area economic characteristics is not clear. Certainly living in extended families is part of American Indian culture, but the relationship for Blacks and Hispanics is not as clearcut. There has been some research on female-headed extended families among nonmetro Blacks as a growing part of their culture, but primarily as a way to cope with employment difficulties for nonmetro Black men.

Unemployment in high poverty areas tends to be underestimated since discouraged workers are common in these areas. This is likely to be the case in counties where the percentage of minorities is high. It seems clear that both extended family structure and nuclear family structure are influenced by economic as well as cultural factors.

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Table 1. Nuclear Type of Family by Residence, 1991

	-----Metro-----		-----Nonmetro-----	
	Number (Thousands)	Percentage	Number (Thousands)	Percentage
Married Couple	18,934	70.3	5,925	73.8
Female Headed	6,939	25.8	1,804	22.5
Male Headed	1,068	4.0	297	3.7
Total	26,940		8,026	

Data source: March Current Population Survey, 1991

Table 2. Extended Family Type by Residence, 1991

	-----Metro-----		-----Nonmetro-----	
	Number (Thousands)	Percentage	Number (Thousands)	Percentage
Primary	24,936	92.6	7,459	92.9
Related Subfamily	1,573	5.8	411	5.1
Unrelated Subfamily	431	1.6	156	1.9
Total	26,940		8,026	

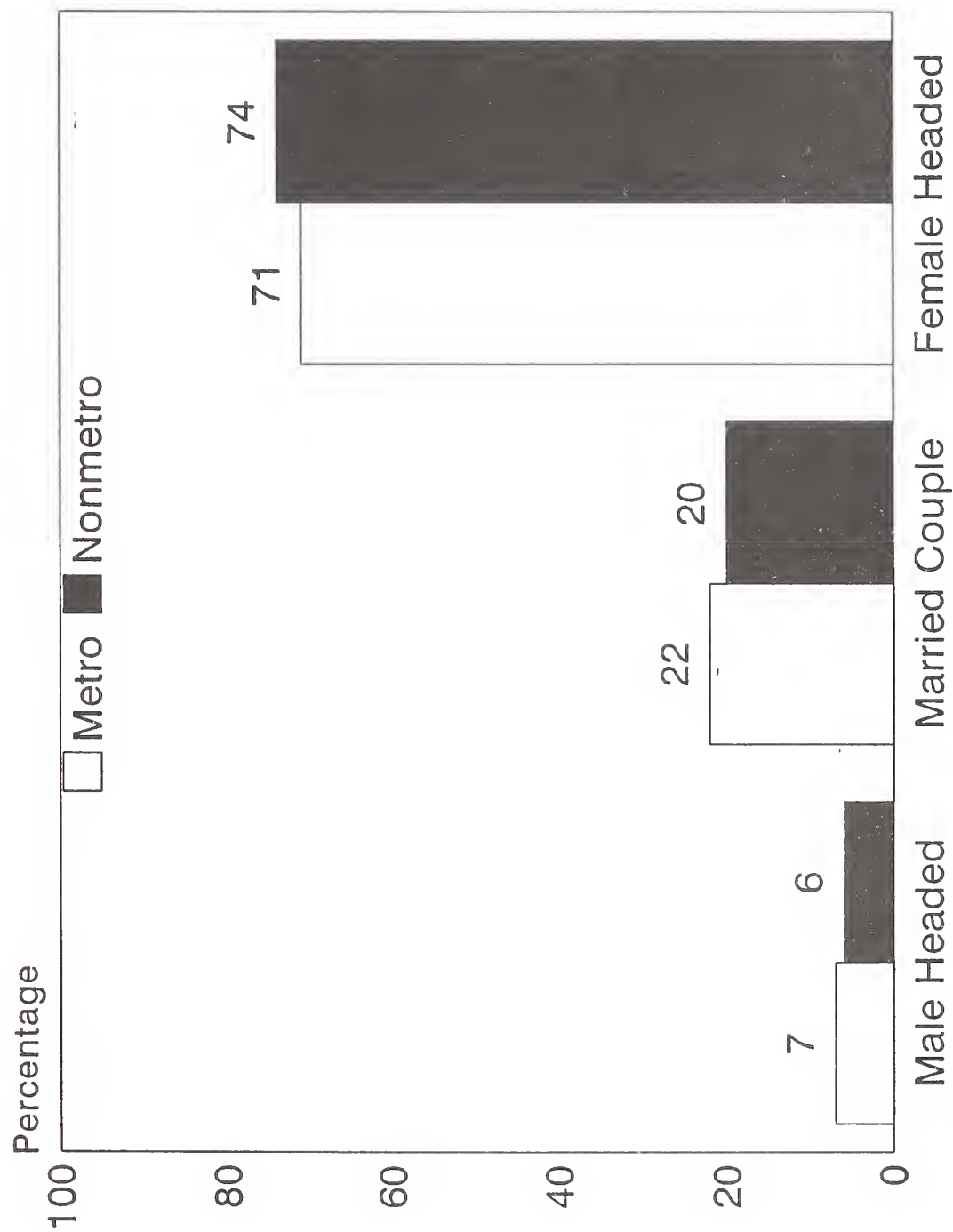
Data source: March Current Population Survey, 1991

Table 3. Extended Family by Nuclear Type of Family, 1991
(Number in thousands)

Family Type	-----Metro-----				-----Nonmetro-----							
	Married Couple Female Headed		Male Headed		Married Couple Female Headed		Male Headed					
	Number	%	Number	%	Number	%	Number	%				
Primary	18,556	98.0	5,459	78.7	920	86.2	5,837	98.5	1,361	75.4	261	88.0
Related Subfamily	341	1.8	1,116	16.1	116	10.9	83	1.4	302	16.8	25	8.5
Unrelated Subfamily	37	0.2	363	5.2	31	2.9	5	0.1	141	7.8	10	3.5

Data source: March Current Population Survey, 1991

Fig. 1 Related Subfamily by Nuclear Type of Family, 1991



Data source: Current Population Survey, March 1991

Fig. 2 Unemployment Rate of Nuclear Families by Residence, 1991

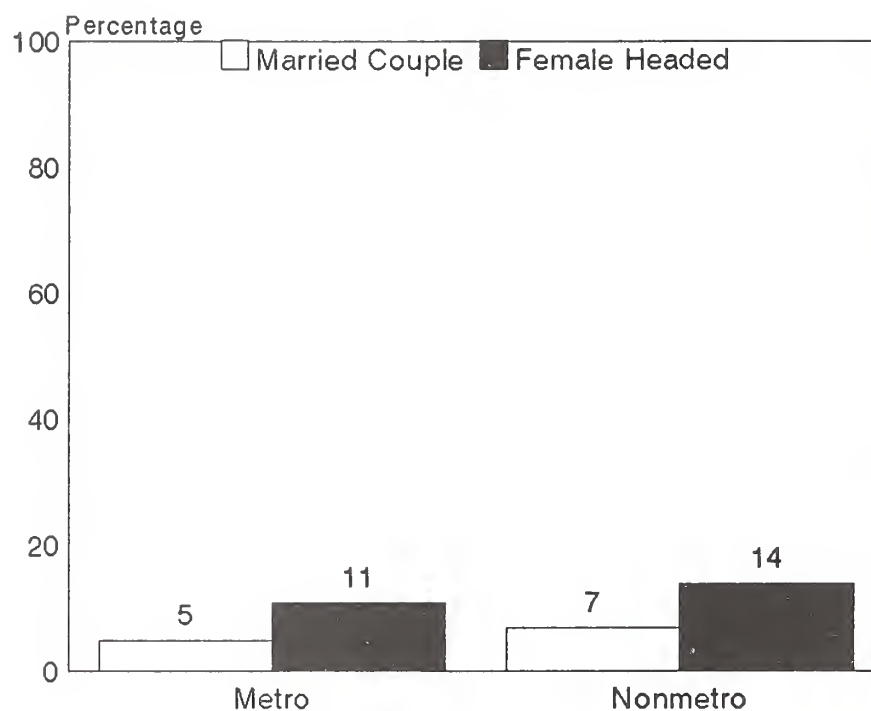
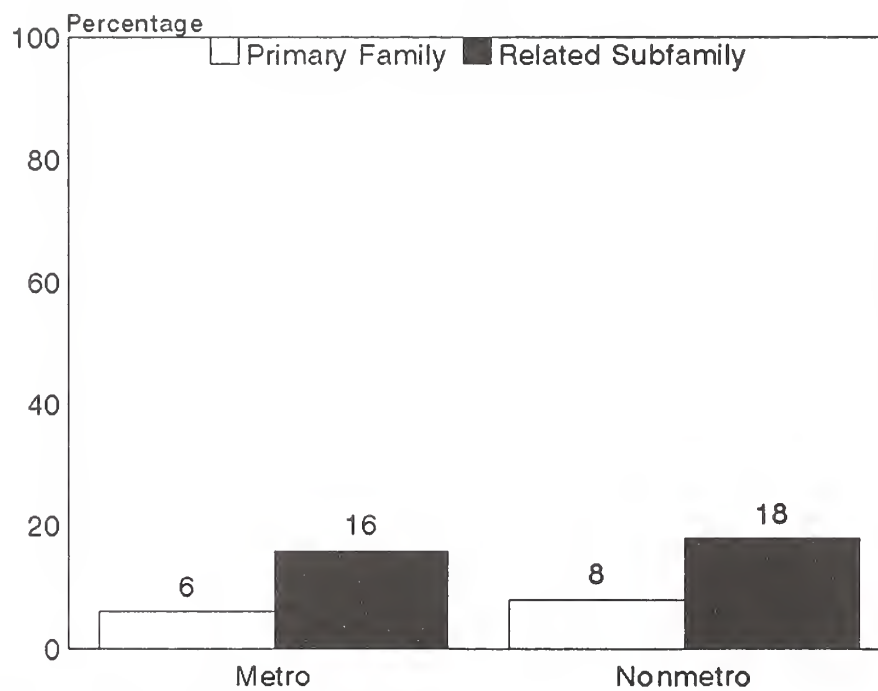


Fig. 3 Unemployment Rate of Related Subfamilies by Residence, 1991



Data source: Current Population Survey, March 1991

Fig. 4 Poverty Rate of Nuclear Families by Residence, 1991

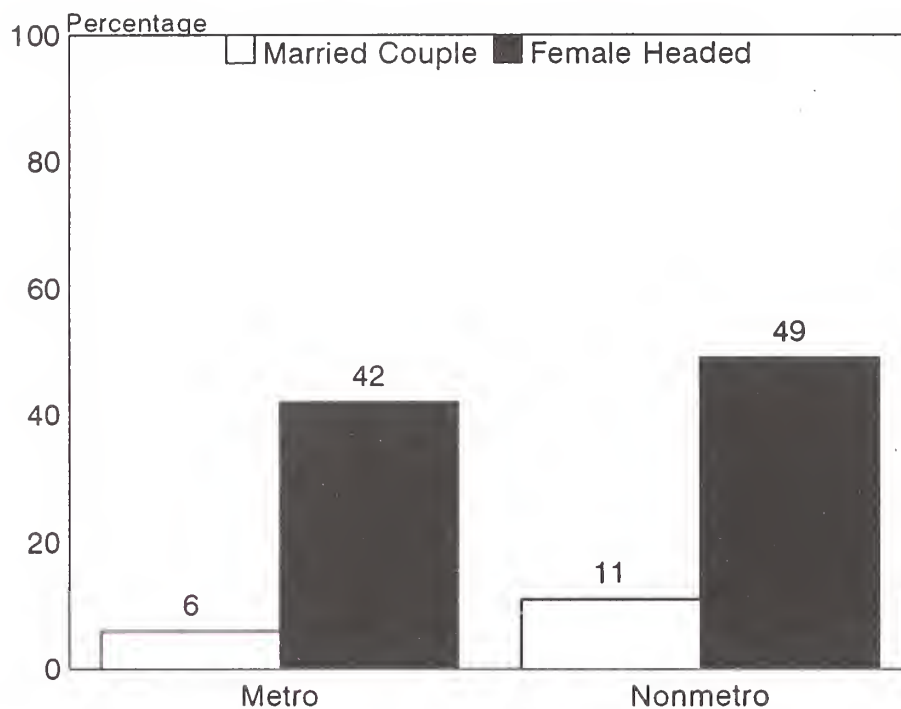


Fig. 5 Poverty Status of Related Subfamilies by Residence, 1991

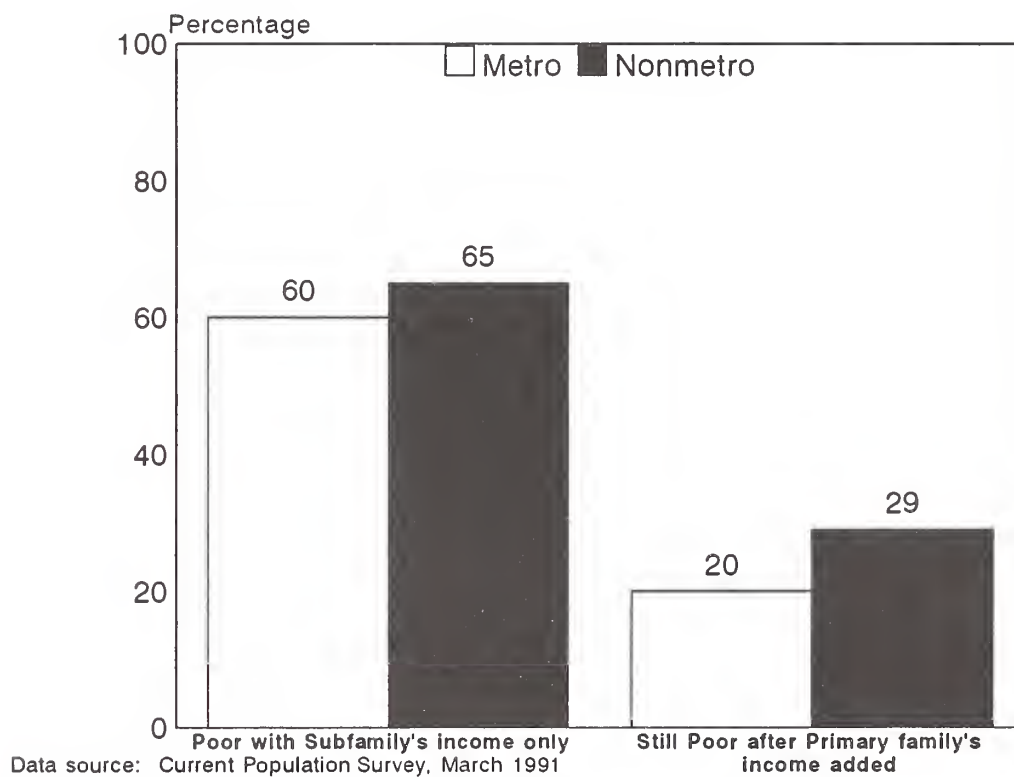
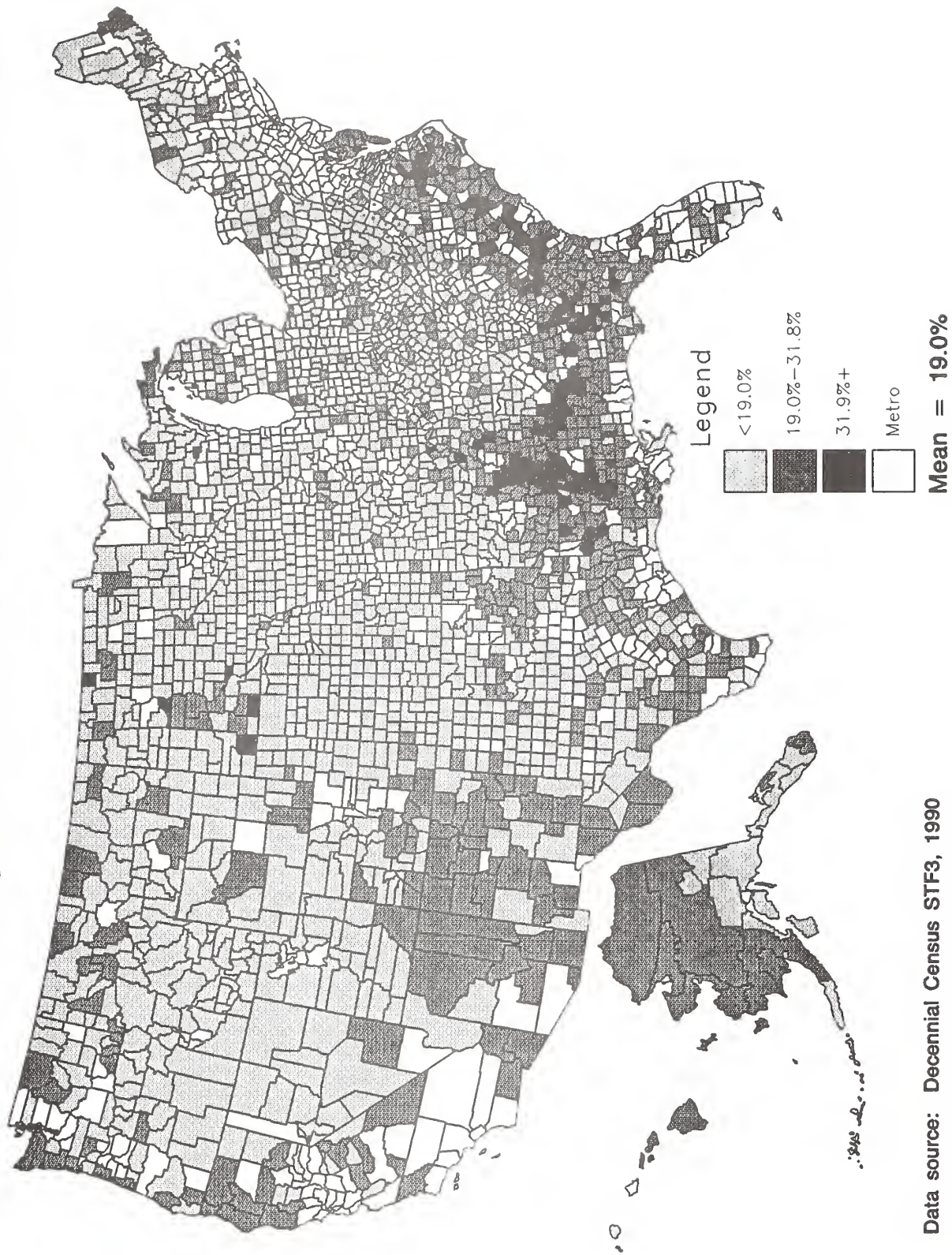
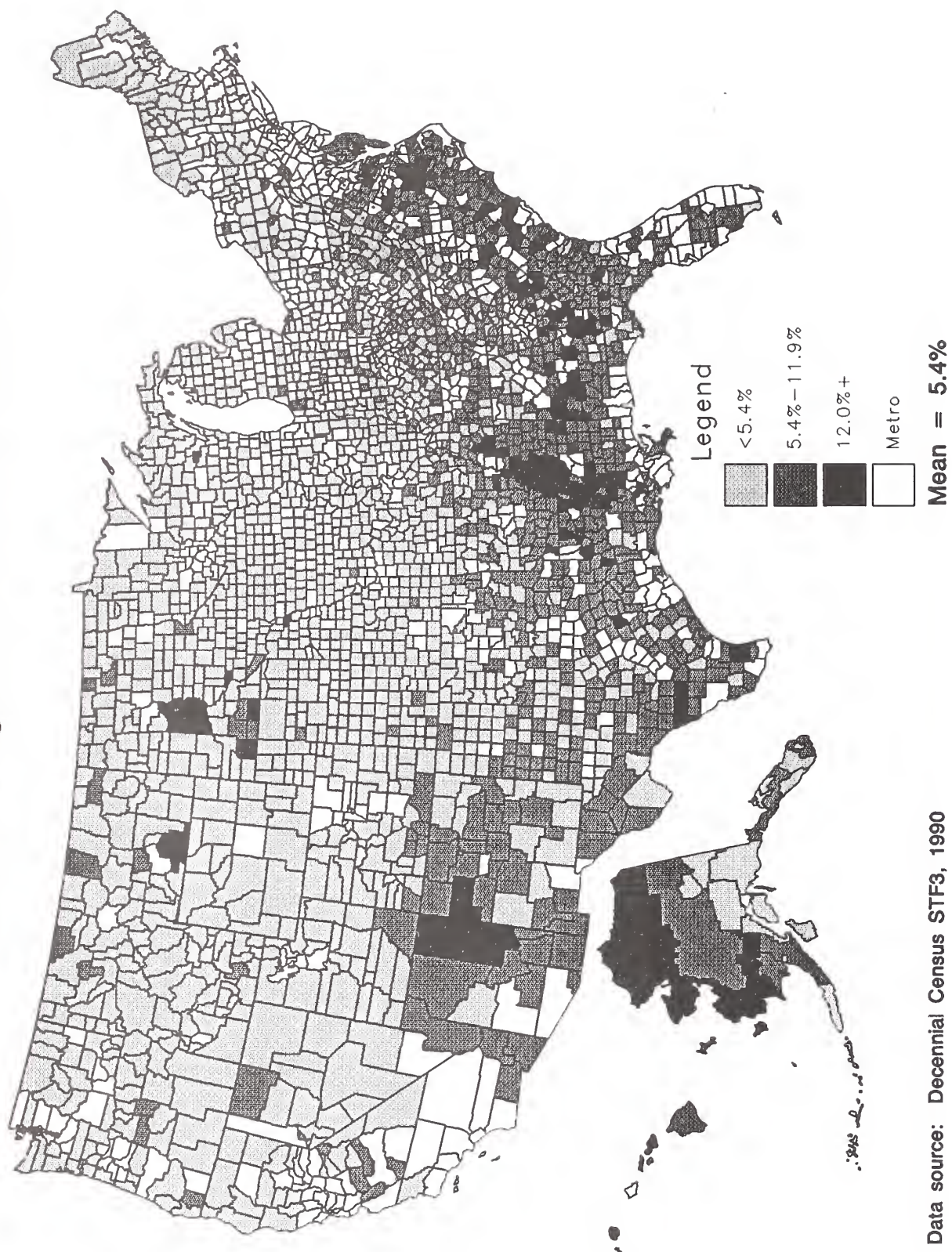


Figure 6. Percentage of Female-headed Families, 1990



Percentage of Subfamilies, 1990

Figure 7.



Outlook '93

For Release: Wednesday, December 2, 1992

ECONOMIC STATUS OF FAMILIES WITH CHILDREN IN RURAL AND URBAN AREAS**Mark Lino
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The economic well-being of families with children concerns all policymakers and professionals who work with families. Prior research on family economic well-being has usually aggregated rural and urban families. However, as social and economic conditions of the two areas differ, the economic well-being of families in rural and urban areas may differ also. Rogers found that a greater proportion of children in nonmetro than metro areas were in poverty (5).

To delineate differences between the economic well-being of families in rural and urban areas for policy and program purposes, this study examines the characteristics and economic status (as measured by income and expenditures) of rural and urban families with children. Three groups of families with children are studied: (1) husband-wife families with at least one child under age 18, (2) husband-wife families with the oldest child under age 6, and (3) single-parent families headed by a female with at least one child under age 18. Implications for policies and programs are discussed in the final section.

Data

Data for this study are from the interview component of the 1989-90 Consumer Expenditure Survey (CE), conducted by the Bureau of the Census for the Bureau of Labor Statistics (BLS). The CE is an ongoing survey that collects data on household expenditures, income, and sociodemographic characteristics. A national sample of consumer units is interviewed once each quarter over the course of a year.¹ Rural areas are defined as areas outside a Metropolitan Statistical Area (MSA) with a population of less than 2,500 persons. Urban

¹A consumer unit consists of either: (1) all members of a particular housing unit who are related by blood, marriage, adoption, or other legal arrangements; (2) two or more people living together who pool their incomes to make joint expenditure decisions; or (3) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent.

areas are areas within an MSA and places of 2,500 or more persons outside an MSA; urban areas include nonmetro areas with a population of 2,500 or more.

The 1989-90 CE contains information from approximately 20,000 quarterly interviews each year. Income data are annual and quarterly expenditure data are multiplied by four to provide estimates of annual expenditures in accordance with BLS methodology. Data are weighted to represent the U.S. noninstitutionalized population in each year-- approximately 96.4 million consumer units.

Of these 96.4 million consumer units, 14 percent resided in rural areas. Husband-wife families with at least one child below age 18 in the home composed a greater share of total consumer units in rural than urban areas (29 percent vs. 23 percent) (figure 1). Single-parent families with at least one child under age 18 in the home accounted for a smaller share of total consumer units in rural than urban areas (4 percent vs. 6 percent).

Consumer units with one or two parents and children only in the home were included in the analysis.² Units with extended family members, such as grandparents, or nonfamily members in the home are classified as "other husband-wife households" for two-parent situations or "other households" for single-parent situations and were not included. Hence, the percentage of consumer units with children under age 18 in the total population is understated here. This is especially true for single-parent situations since about 21 percent of them reside in a household composed of their own children and others (7). Also, the groups of families with children described here are probably more economically advantaged than those living with others because many people who reside with others do so for financial reasons.

Married Couples With at Least One Child Under Age 18

A larger proportion of married couples with at least one child under age 18 in rural than urban areas were white (97 percent vs. 88 percent) (table 1). Average age of husbands and wives was similar in the two areas, 37 or 38 for husbands and 35 for wives. Married couples in rural areas had less formal education than their urban counterparts. Eighteen percent of husbands and 14 percent of wives in rural areas had a college degree or more, compared with 32 percent of husbands and 24 percent of wives in urban areas. Seventeen percent of husbands and wives in rural areas did not have a high school diploma versus 13 percent of husbands and 14 percent of wives in urban areas. Average family

²Unweighted sample sizes for husband-wife families with at least one child under age 18 were 1,381 in rural areas and 8,893 in urban areas; for husband-wife families with the oldest child under age 6, sample sizes were 311 in rural areas and 2,549 in urban areas; and for female single-parent families with at least one child under age 18, sample sizes were 119 in rural areas and 2,082 in urban areas.

size was 4.1 for both areas. Twenty-eight percent of rural families had an income of \$40,000 and over, compared with 49 percent of urban families.³

Before-tax income of rural married-couple families with at least one child under age 18 averaged \$33,114 and that of urban families was 33 percent higher at \$44,011 (table 2). Earnings of husbands and wives accounted for most of before-tax family income in both rural and urban families. Seventy-five percent of wives in rural areas and 73 percent of those in urban areas were in the labor force. A majority of these employed women worked part time. On average, both rural and urban wives' earnings accounted for 23 percent of family income.

Total expenditures of rural married-couple families with at least one child under age 18 averaged \$28,874, and that of urban families, \$36,645. Part of this expenditure difference is probably related to the lower cost of living in rural areas. The proportion of the difference that can be explained by this lower cost of living in rural areas is unknown. Hence, the question of whether urban families with children are better off economically than their rural counterparts cannot be adequately answered.

Housing and transportation accounted for the largest shares of total expenses for rural families, each consuming 25 percent of the budget. For urban families, housing made up a much higher proportion of total expenses than transportation (29 percent vs. 20 percent). In actual dollar terms, transportation expenses were not very different between the two groups, although the average number of vehicles owned was higher for rural families (3.2 vs. 2.6 for urban families). This reflects the lack of much public transportation in rural areas.

Although housing accounted for a higher share of total expenses for urban families, home ownership was greater among rural families: 83 percent of rural families owned a home, compared with 72 percent of their urban counterparts. Also, a much larger percentage of families in rural than urban areas owned a home without a mortgage (25 percent vs. 7 percent). Many rural families reside in less costly types of housing. Nineteen percent of rural families lived in a mobile home, compared with 3 percent of urban families. The average sales price of a mobile home was \$27,000 in 1989 (6).

Food accounted for the third largest expense for both rural and urban families. A slightly higher share of total expenses in rural families went for food (18 percent compared to 16 percent for urban families). Pensions and retirement, which includes Social Security taxes (such taxes are considered an expenditure in the Consumer Expenditure Survey) made up the fourth largest expense (10 or 11 percent). Entertainment accounted for 6 percent of total expenses, clothing 5 or 6 percent, health care 4 or 5 percent, child care 1 or

³Incomes reported here and for other family groups include only complete income reporters. Complete income reporters are those who provide values for major sources of income such as wages and salaries, self-employment income, and Social Security income.

2 percent, and other expenses (personal care, education, and miscellaneous goods and services) 5 or 6 percent.

Married Couples With the Oldest Child Under Age 6

Husband-wife families with young children (the oldest child under age 6) are one of the more economically vulnerable family groups (3). These families, therefore, warrant separate analysis from married couples with at least one child under age 18.

A higher proportion of married couples with young children in rural than urban areas were white (97 percent vs. 90 percent) (table 3). Average age of husbands and wives in rural areas (29 and 27, respectively) was slightly lower than that of their counterparts in urban areas (32 and 29). Heaton et al. found that couples in rural areas marry earlier (2). Educational level was also lower for husbands and wives in rural areas. Twenty percent of husbands and 16 percent of wives in rural areas had a college degree or more, compared with 33 percent of husbands and 31 percent of wives in urban areas. Family size averaged 3.5 in both areas. Fourteen percent of rural families had an income of \$40,000 and over, compared with 44 percent of urban families.

Average before-tax income of married couples with the oldest child under age 6 was 55 percent higher in urban than rural areas (\$40,785 vs. \$26,376) (table 4). This area income differential is much greater than that for married couples with at least one child under age 18. Given that families with young children face economic difficulties, those in rural areas seem especially susceptible to such problems.

Despite the income difference between rural and urban families with young children, wives' employment was similar in the two areas. Seventy percent of wives in rural areas and 71 percent of wives in urban areas were in the labor force; again, a majority of these women worked part time. On average, wives' earnings accounted for 27 percent of overall income for rural families with young children and 26 percent for urban families.

Average total expenditures amounted to \$25,037 for rural families and \$33,333 for urban families. This highlights the economic difficulties of rural families with young children since their total expenditures exceeded their after-tax income. Housing accounted for the largest share of expenses, 27 percent for rural and 32 percent for urban families. Seventy-five percent of rural and 59 percent of urban families were homeowners; 20 percent of rural and 4 percent of urban families owned a home without a mortgage. Again, a large proportion of rural families reside in mobile homes; 31 percent of those with young children lived in a mobile home, compared with 3 percent of their urban counterparts (figure 2).

Transportation made up the second largest share of total expenses for families in both areas, but was higher for rural families (25 percent vs. 19 percent for urban families). The actual dollar amount spent, however, was similar for the two groups. Food accounted for the third largest expenditure share for

both and a higher proportion but lower dollar amount for rural families (16 percent vs. 14 percent for urban families).

Child care accounted for 4 percent of total expenditures for families in both areas. In dollar terms, this was \$920 for rural families and \$1,350 for urban families. These average figures include those with and without child-care expenses. Fifty percent of rural families with young children reported such expenses with a mean of \$1,836 among those with the expense. For urban families, 57 percent had such expenses with a mean of \$2,390 among those with the expense. That a large proportion of families in both areas did not report child-care expenses does not suggest they did not use some form of child care. A Census study found that for children under age 5, 37 percent were cared for by a relative (usually nonpaid), such as a grandparent, while the mother worked (4).

Single-Parents With at Least One Child Under Age 18

As most single parents are female, this section will examine only female-headed, single-parent families with at least one child under age 18. Male single parents tend to have a much higher income, which skews results. Interestingly though, a higher proportion of single parents in rural than urban areas were male (16 percent vs. 10 percent).

Among female single parents, 71 percent in rural areas and 66 percent in urban areas became a single parent through divorce or separation (these figures include a small percentage who were not legally separated)(figure 3). A lower proportion of single parents in rural than urban areas had a child out-of-wedlock (17 percent vs. 27 percent), whereas a higher proportion in rural areas were widowed (12 percent vs. 7 percent). Compared with married couples with at least one child under age 18, a lower percentage of single-parent families were white: 78 percent of single-parent families in rural areas and 60 percent in urban areas (table 5).

Average age of single parents was 39 in rural areas and 34 in urban areas. This reflects the higher proportion of unmarried single parents in urban areas; unmarried single parents tend to be younger than divorced or widowed single parents. Educational level was similar for single parents in both areas. However, it was below that of wives in married-couple families. Eleven percent of single parents in rural areas and 12 percent in urban areas had a college degree or more; 23 percent in rural areas and 26 percent in urban areas did not have a high school diploma. Family size averaged 2.8 in rural areas and 3.0 in urban areas. Income of single-parent families in rural compared with urban areas was less skewed; 37 percent of rural families had an income less than \$10,000 and 9 percent had an income of \$30,000 and over, compared with 43 and 13 percent, respectively, of urban single-parent families.

Of the three family groups examined, the income difference of female-headed, single-parent families was least pronounced between rural and urban areas. Before-tax income of rural single-parent families averaged \$14,802 and that of urban single-parent families was 10 percent higher at \$16,237 (table 6). One

reason for this smaller income differential was that rural single parents were older than their urban counterparts so likely had more job skills and experience. Also, because a higher proportion of single parents in rural areas were divorced or separated (rather than never married), they were more likely to receive child support. The income of single-parent families, however, was much lower than that of married-couple families with children in both areas, even after adjusting for family size.

Earnings of the female head accounted for 68 percent of income in rural and urban families; the remainder was derived from other sources, such as child support and public assistance. Sixty-eight percent of the female heads in rural families and 73 percent in urban families were in the labor force. More women worked full time than part time.

Total expenditures averaged \$13,657 for rural single-parent families and \$17,624 for urban families. For urban families, expenditures exceeded after-tax income. Housing accounted for the largest expenditure share for families in both areas, 31 percent for rural families and 36 percent for urban families. Although housing accounted for such a large proportion of total expenses for urban families, only 30 percent owned a home. A larger percentage of single-parent families in rural areas were homeowners (57 percent); 32 percent resided in a mobile home.

Food made up the second largest share of total expenditures (23 percent for rural families and 21 percent for urban families), and transportation the third (18 percent for rural families and 15 percent for urban families). Altogether, housing, transportation, and food accounted for 72 percent of total expenses for rural and urban single-parent families.

Discussion

At least four major policy or program implications are suggested by this study on the economic status of families with children in rural and urban areas. First, for married couple families with children in rural and urban areas, wife's earnings account for a significant proportion of total family income. For female-headed families with children in rural and urban areas, mother's earnings made up the majority of total family income. Public policy needs to reflect the importance of women's income in families in both areas and promote the stability of this income, perhaps through the supply of adequate and affordable child care.

Second, rural families with young children (the oldest child under age 6) were found to have total expenditures that exceeded their after-tax income. These families may be going into debt. Further study is needed to determine how this debt is being handled. If these families are experiencing financial difficulties, programs in financial management may be in order.

Third, the characteristics of female-headed, single-parent families in rural areas differ from that of their urban counterparts. More urban single parents had an out-of-wedlock birth; they also had a lower level of education. Policies and programs targeted to these families need to be aware of the

distinctions between rural and urban single-parent families and address the special needs of each.

Lastly, a large proportion of rural families with children resided in mobile homes. Recent natural disasters in the United States have called into question whether all such homes meet adequate safety standards. The Federal Government is presently addressing this concern. Given that 31 percent of married couples with young children and 32 percent of single-parent families with children in rural areas lived in mobile homes, this issue is very important.

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Table 1. Characteristics of married-couple families with at least one child under age 18 in rural and urban areas, 1989-90

Characteristics	Rural	Urban
Race		
White	97%	88%
Non-White	3	12
Husband's age		
Under 30	20	16
30 - 34	20	21
35 - 39	23	22
40 and over	37	41
Wife's age		
Under 30	26	23
30 - 34	24	24
35 - 39	25	25
40 and over	25	28
Husband's education		
Some high school or less	17	13
High school diploma	47	30
Some college	18	25
College degree or more	18	32
Wife's education		
Some high school or less	17	14
High school diploma	47	36
Some college	22	26
College degree or more	14	24
Household size		
Three (one child)	30	32
Four (two children)	45	41
Five or more (three or more children)	25	27
Before-tax income		
Less than \$10,000	7	6
\$10,000 - \$19,999	17	12
\$20,000 - \$29,999	26	15
\$30,000 - \$39,999	22	18
\$40,000 and over	28	49

Table 2. Income and expenditures of married-couple families with at least one child under age 18 in rural and urban areas, 1989-90

	Rural	Urban
Before-tax income	\$33,114	\$44,011
After-tax income	30,316	39,998
Total expenditures	\$28,874	\$36,645
Housing	25%	29%
Transportation	25	20
Food	18	16
Entertainment	6	6
Pensions and retirement	10	11
Clothing	5	6
Health care	5	4
Child care	1	2
Other	5	6

Table 3. Characteristics of married-couple families' with the oldest child under age 6 in rural and urban areas, 1989-90

Characteristics	Rural	Urban
Race		
White	97%	90%
Non-White	3	10
Husband's age		
Under 30	62	41
30 - 34	25	32
35 and over	13	27
Wife's age		
Under 30	75	53
30 - 34	18	29
35 and over	7	18
Husband's education		
Some high school or less	17	10
High school diploma	47	32
Some college	16	25
College degree or more	20	33
Wife's education		
Some high school or less	17	10
High school diploma	42	32
Some college	25	27
College degree or more	16	31
Household size		
Three (one child)	52	60
Four (two children)	43	35
Five or more (three or more children)	5	5
Before-tax income		
Less than \$10,000	11	6
\$10,000 - \$19,999	20	14
\$20,000 - \$29,999	32	18
\$30,000 - \$39,999	23	18
\$40,000 and over	14	44

Table 4. Income and expenditures of married-couple families with the oldest child under age 6 in rural and urban areas, 1989-90

	Rural	Urban
Before-tax income	\$26,376	\$40,785
After-tax income	24,830	37,022
Total expenditures	\$25,037	\$33,333
Housing	27%	32%
Transportation	25	19
Food	16	14
Entertainment	5	5
Pensions and retirement	10	12
Clothing	4	5
Health care	4	4
Child care	4	4
Other	5	5

Table 5. Characteristics of female-headed, single-parent families with at least one child under age 18 in rural and urban areas, 1989-90

Characteristics	Rural	Urban
Race		
White	78%	60%
Non-White	22	40
Age		
Under 30	15	29
30 - 34	21	24
35 - 39	20	24
40 and over	44	23
Education		
Some high school or less	23	26
High school diploma	41	35
Some college	25	27
College degree or more	11	12
Household size		
Two (one child)	40	39
Three (two children)	46	36
Four or more (three or more children)	14	25
Before-tax income		
Less than \$10,000	37	43
\$10,000 - \$19,999	34	29
\$20,000 - \$29,999	20	15
\$30,000 and over	9	13

Table 6. Income and expenditures of female-headed, single-parent families with at least one child under age 18 in rural and urban areas, 1989-90

	Rural	Urban
Before-tax income	\$14,802	\$16,237
After-tax income	14,386	15,334
Total expenditures	\$13,657	\$17,624
Housing	31%	36%
Transportation	18	15
Food	23	21
Entertainment	6	4
Pensions and retirement	7	6
Clothing	5	7
Health care	4	3
Child care	1	2
Other	5	6

Figure 1. Composition of consumer units in rural and urban areas, 1989–90

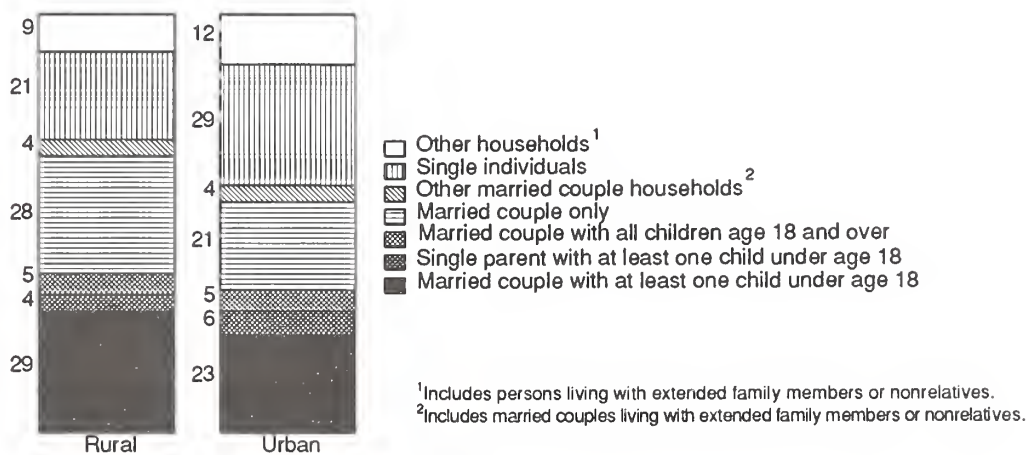


Figure 2. Type of dwelling resided in by married-couple families with the oldest child under age 6 in rural and urban areas, 1989–90

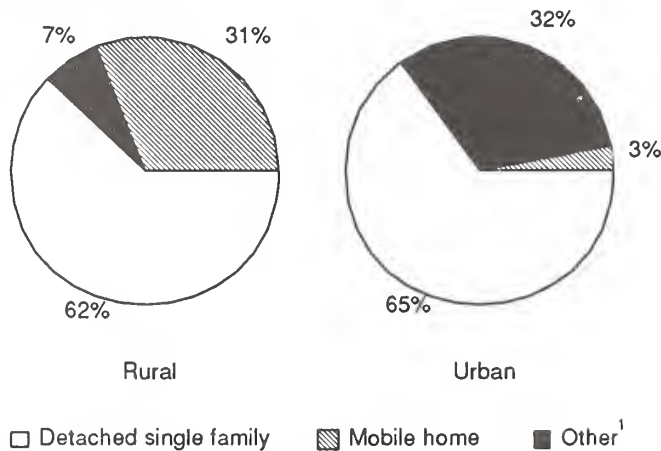
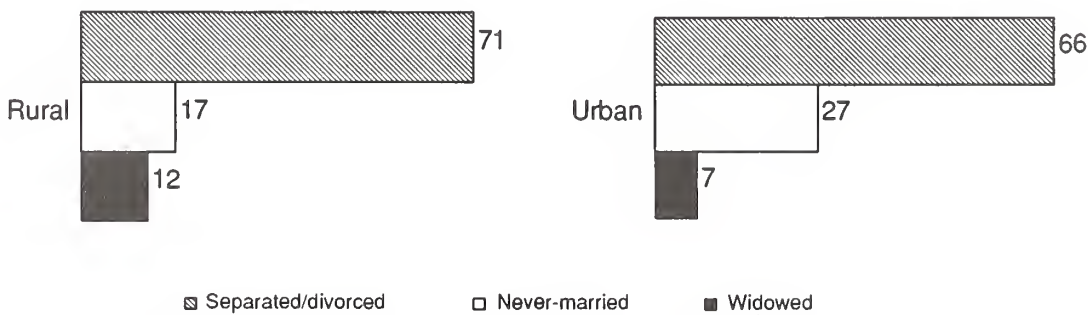


Figure 3. Marital status of female-headed single-parent families with at least one child under age 18 in rural and urban areas, 1989–90



Outlook '93

For Release: Wednesday, December 2, 1992

HEALTH INSURANCE COVERAGE OF RURAL FAMILY MEMBERS

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I. INTRODUCTION

Americans obtain health insurance from a variety of private and public sources. Virtually all of the elderly are protected by the Medicare program. In contrast, a substantial majority of those under age 65 are covered by private insurance provided through employers or unions. Smaller proportions have private coverage purchased outside the workplace, or public coverage for the poor, disabled, medically needy, and military personnel. Despite the multiple sources of coverage, more than 34 million persons under age 65 were uninsured in 1990 (U.S. Bureau of the Census 1991). The lack of health insurance has become an important national issue because the uninsured have less access to medical care than other Americans, and the cost of their care has been increasingly shifted to local community hospitals.

The size of the uninsured population reflects the extensive gaps in the present system of mixed private and public health insurance coverage (Wilensky 1988). Some gaps exist because employers do not always provide health benefits for workers or their families. Other gaps occur because individuals are unable to afford the cost of private coverage, or else have been classified as poor health risks and denied coverage by insurers. Many persons without private coverage are protected by the Federal-state Medicaid program. However, a substantial number of the poor and unemployed are ineligible for Medicaid, particularly in states with more restrictive eligibility requirements.

The gaps in health insurance coverage are even greater in rural areas than urban centers. Rural workers are less likely than urban workers to be employed by the large firms that are most likely to provide health benefits. Rural families have lower incomes than urban families, reducing their ability to purchase private coverage outside the workplace. The poor and unemployed also tend to have less access to public coverage in rural areas because predominantly rural states have more restrictive Medicaid eligibility requirements than urban states (Summer 1991).

Farm families face special problems in obtaining health insurance. The private coverage available to self-employed workers including farmers generally costs more than employee group coverage, due in part to the higher administrative expenses for health insurers. Some insurers also treat farm workers as poor health risks and exclude them from coverage, narrowing the choice of health insurance for farm families.

This study investigated the various factors affecting the health insurance coverage of family members under age 65. The principal question considered was whether rural residents and farm family members had lower odds of being

insured than other Americans. The next section describes the data source. Section III discusses the method of analysis, and Sections IV and V describe the results. The final section summarizes the findings.

II. DATA SOURCE

The Current Population Survey. Data on the health insurance coverage and other characteristics of individuals were obtained from the March, 1990 Current Population Survey (CPS). The CPS is a regular monthly survey of the civilian noninstitutional population and Armed Forces members living in civilian housing conducted by the U.S. Bureau of the Census. The March, 1990 CPS was based on a sample of nearly 60,000 households, and included an annual section on health insurance coverage initiated in 1980 (U.S. Bureau of the Census 1990).

The March, 1990 CPS asked whether individuals were covered by various types of health plans during 1989. Persons covered at any time during the year were classified as insured. All other persons lacking coverage for the entire year were classified as uninsured. This definition of the uninsured was somewhat restrictive since many persons experience temporary losses of insurance coverage lasting less than one year (Nelson and Short 1990).

Types of Coverage. The March, 1990 CPS provided limited information about the type of coverage of insured persons. The major categories: (1) employment-related private coverage obtained through an employer or union; (2) other types of private coverage obtained outside the workplace; and (3) public coverage, including Medicare, Medicaid, and military-related benefits. Some persons were classified in more than one category, including those who changed health plans during the year. Other persons with private coverage could not always be classified according to whether the coverage was employment-related. The CPS is therefore more useful as a source of data about whether persons were insured than about differences in types of coverage.

III. METHODS

Study Population. Health insurance coverage depended on different factors among family members and other persons. Many family members received coverage through an insured spouse or parent since health insurers generally provided coverage for family units. In contrast, the chances of coverage for those who lived alone or with non-relatives depended on personal rather than family characteristics. This analysis was limited to family members because of the focus in this session on the condition of rural families.

Family members were defined as members of primary families headed by household heads, or related subfamilies headed by relatives of household heads. More than 87 percent of the population under age 65 were classified as family members under this definition. Primary and related subfamily members from the same household were treated as a single family headed by the household head.

Nuclear and Extended Kin. Family members were divided into two kinship categories corresponding to the definition of family units employed by health insurers. More than 84% were classified as nuclear kin (household heads and their spouses and children under age 18) normally included in the family units recognized by insurers. The remainder were classified as extended kin (adult children and other relatives of household heads) normally excluded from family units by insurers, with some exceptions for children attending school (Table 1).

Rural and Farm Families. Family members were classified as urban if they lived in metropolitan counties, and as rural if they lived in nonmetropolitan counties. Families from households where one or more adults were farm

operators or managers were classified as farm families. In 1989, 72% of farm family members were rural residents and 28% were urban residents.

Determinants of Health Insurance Coverage. The odds that individual family members had any type of health insurance were presumed to depend on: (1) whether the family head or his/her spouse had access to coverage, and (2) whether the family head decided to accept available coverage. The odds that extended kin had coverage were also presumed to depend on their personal characteristics since many had independent access to coverage.

The principal determinants of access to coverage appeared to be employment and income, and the principal determinant of the decision to accept coverage appeared to be education. Several other factors were expected to have an independent effect on coverage, including rural residence and farm status. Since the determinants of coverage differed between nuclear and extended kin, the analysis was conducted separately for each group.

Rural Residence and Farm Status Effects. The analysis focused on whether rural residents and farm family members were less likely to be insured than other persons. There were several reasons why rural residence and farm status might be expected to reduce access to coverage, independently of other factors. First, small towns probably had fewer sources of private insurance than urban centers. Second, the process of applying for public coverage was likely to be less convenient outside urban centers. Third, employers may have been more reluctant to offer health benefits in rural areas where high unemployment and low wages tended to reduce competition for labor. Finally, some health insurers denied coverage to farm workers, further reducing the sources of coverage for farm families.

Employment Effects. Employment affected access to health insurance in two ways. First, employment provided access to the group coverage traditionally offered by U.S. employers. Group coverage tended to be less expensive and subject to fewer restrictions than other private coverage available outside the workplace. However, large firms were more likely to provide coverage than small firms due to the lower cost of coverage for larger employee groups. Firms were also more likely to offer coverage to full-time permanent workers than part-time, temporary, or newly hired workers perceived to be less committed to particular employers.

Second, employment also determined whether families had access to specific categories of public coverage. Families headed by employed workers were generally ineligible for Medicaid benefits for the non-working or unemployed poor, as well as Medicare benefits for disabled workers.

The impact of employment was examined by classifying family members into three categories according to the employment status of the family head and spouse (Appendix I). The status of both the head and spouse were considered because insurance provided to either partner generally covered the family unit. Families headed by full-time permanent workers for large firms were expected to have the best access to employment-related private coverage. Families headed by non-workers were expected to have the best access to many categories of public coverage. Families headed by other workers were expected to have relatively less access to either type of coverage. The latter category included small firm and part-time workers, as well as self-employed persons and workers who spent part of the year unemployed or outside the labor force.

Income Effects. Family income affected access to health insurance coverage because families with higher incomes were better able to afford the cost of employment-related or other private coverage. In contrast, families with incomes below the poverty level were most likely to qualify for public coverage for the poor. Income was measured by classifying families into four

income categories in relation to the official poverty level (Appendix I).

Education Effects. Persons with access to affordable health insurance did not always choose to be insured. The decision to obtain insurance was influenced by the perceived risk of high medical expenditures and the cost of coverage, as well as personal tolerance for risk. Persons with greater education were expected to make more informed decisions about risks and costs, choosing coverage more frequently than those with less education. The impact of education was measured by classifying families into three categories according to the education of the family head, assumed to have the most influence in decisions about coverage.

Characteristics of Extended Kin. Extended kin could obtain independent access to health insurance through employment. The impact of employment was measured by dividing extended kin into the same employment categories described above. Members of related subfamilies were classified according to the employment status of the subfamily head and spouse. Other extended kin were classified according to their own employment status.

Extended kin with independent access to health insurance had to decide whether to utilize affordable coverage. The impact of education on this decision was measured by dividing extended kin into the same education categories described above. Members of related subfamilies were classified according to the education of the subfamily head, and other extended kin were classified according to their own education.

Adult children of family heads under age 25 and enrolled in school had better access to private coverage than other extended kin because they were often included in the family units defined by health insurers. The impact of student dependent status on coverage was measured by dividing extended kin into two categories (Appendix I). More than one-fifth of extended kin were classified as student dependents (Table 1).

Other Factors. Additional measures of family type, region, and demographic characteristics were included in the analysis as controls. The family type measure distinguished married couple families with two potential workers and more chances to obtain coverage through employment from female-headed families most likely to qualify for some categories of public coverage, and male-headed families lacking either advantage. The region measure captured geographic variations in the availability of coverage due to differences in local labor markets, state insurance regulations, and Medicaid eligibility requirements (Appendix I). Measures of the age, sex, and race of individual family members identified possible biases in the provision of coverage by employers, health insurers, and public agencies (Appendix I).

Empirical Model. Health insurance coverage was measured by a qualitative, dichotomous variable indicating whether individual family members were insured. The effects of the various explanatory factors on coverage were assessed using logit regression techniques. The analysis of nuclear kin was based on a 30% random sample of the 104,778 eligible cases from the March, 1990 CPS. The analysis of extended kin was based on all 18,123 eligible cases.

IV. PATTERNS OF HEALTH INSURANCE COVERAGE

Rate of Coverage. The distinction made by health insurers between nuclear kin (family heads, spouses, and children under age 18) and extended kin (older children and other relatives of family heads) had a major impact on health insurance coverage. Only 71% of extended kin had some type of coverage during 1989, in contrast to 89% of nuclear kin (Table 2). Nearly half of all extended kin without coverage were members of families whose head or spouse

had private health insurance, and presumably would have been covered if health insurers used a less restrictive definition of family units.

Rural residence was associated with a lower rate of coverage among both nuclear and extended kin. The difference in coverage between urban and rural areas was not great, but nearly one million more persons would have been insured if rural residents had obtained coverage as frequently as urban residents.

Farm family membership was associated with a lower rate of coverage among nuclear kin. However, extended kin from farm families were more likely to be insured than those from nonfarm families.

Insurance coverage was also related to other factors, as expected (Table 2). In general, persons from families with large firm workers, higher incomes, and more educated heads were most likely to have health insurance. The rate of coverage was also higher for families headed by married couples, residents of the Northeast and Midwest, and non-Hispanic whites. In contrast, the impact of age and sex on coverage depended on whether individuals were classified as nuclear or extended kin.

Type of Coverage. Rural residents tended to have different types of coverage than urban residents (Figure 1). In comparison to urban residents, rural residents were less likely to have employment-related group coverage, and more likely to have private coverage obtained outside the workplace. The same patterns were evident among both nuclear and extended kin. The difference in types of coverage was important because employment-related coverage generally cost less than other types of private coverage.

A similar difference in types of coverage was apparent between farm and nonfarm family members (Figure 2). Farm family members were less likely to have employment-related group coverage, and considerably more likely to have other types of private coverage. They were also less likely to have public coverage. The greater dependence on other types of private coverage among farm families might account for the higher rate of coverage of farm extended kin, since health insurers may have been more willing to include extended kin under individual than group policies.

V. DETERMINANTS OF HEALTH INSURANCE COVERAGE

The lower rate of health insurance coverage in rural areas was not necessarily due to rural residence, since rural residents tended to have other characteristics associated with lower rates of coverage. In particular, rural families were less likely to be headed by large firm workers than urban families, and more likely to have low incomes and less educated heads (data not shown).

Similarly, the lower rate of coverage among farm nuclear kin may have been due to other factors than farm status. In comparison to nonfarm families, farm families were also less likely to be headed by large firm workers, and more likely to have low incomes and less educated heads (data not shown).

The logit regression results reveal the net effects of rural residence, farm status, and other factors on health insurance coverage. The regression coefficients reported in Table 3 are the odds ratios, interpreted as the multiplicative effect of each variable on the odds of having coverage. The odds of coverage are determined by dividing the probability of being insured by the probability of being uninsured. The overall odds of coverage for nuclear kin were 7.8, computed by dividing the percent with health insurance (88.6) by the percent without health insurance (11.4). The comparable odds for extended kin were 2.4 (70.7/29.3).

Each factor included in the model was measured by one or more dichotomous variables. The odds ratios for factors measured by one variable (e.g. residence) represent the proportionate change in the odds of coverage due to classification in the specified category of the variable (e.g. rural) in comparison to the other category (e.g. urban). In contrast, the odds ratios for factors measured by two or more variables (e.g. income) represent the change in the odds of coverage due to classification in the specified category (e.g. near poor) in comparison to the omitted category for that particular factor (e.g. poor).

Nuclear Kin. Among nuclear kin, rural residents had significantly higher odds of coverage than urban residents. This result was unexpected in view of the plausible ways in which rural residence might reduce access to coverage. The positive relationship implies that rural residents either had greater access to coverage, or else were more likely to accept available coverage.

In contrast, there was no significant difference in the odds of coverage between farm and nonfarm nuclear kin, once other factors were controlled. This finding indicated that the lower rate of coverage among farm nuclear kin was due to other factors than farm status.

Other factors included in the model generally had the anticipated effects. Families headed by large firm workers or non-workers had greater odds of coverage than families headed by other workers. The odds of coverage were also greater for families with higher incomes and more educated heads, although the difference between poor and near-poor families was not significant.

The impact of family type was unexpectedly complex, since female-headed families had greater odds of coverage than those headed by married couples. The special eligibility of female-headed families for public coverage apparently compensated for the absence of a male adult with potential access to employment-related coverage.

The odds of coverage also varied significantly by region, age, and race. The effects of region reflected other unmeasured factors, including differences in state insurance regulations, Medicaid eligibility requirements, and local employment practices. The effects of age and race suggested that there were serious biases in the provision of coverage affecting young adults and nonwhites.

Extended Kin. Rural residence had no significant impact on the odds of health insurance coverage among extended kin, in contrast to the pattern among nuclear kin. However, extended kin from farm families had significantly higher odds of coverage than those from nonfarm families. This result was also unexpected, and implies that farm status affected access to coverage or the decision to accept available coverage.

Most of the other factors included in the model had the same approximate effects on coverage among nuclear and extended kin. One exception involved family type, since extended kin from married couple and female-headed families had equal odds of coverage. Another exception involved sex, since females had significantly higher odds of coverage among extended kin.

The additional factors included to measure the independent access of extended kin to coverage generally had the anticipated effects. The odds of coverage were greater for those who worked for large firms or belonged to subfamilies headed by large firm workers, as well as those who graduated from high school or belonged to subfamilies headed by high school graduates. Extended kin classified as student dependents also had much higher odds of coverage than other persons.

VI. SUMMARY

Rural residents and farm family members had lower rates of health insurance coverage than other Americans during 1989. However, the lower rates were due to factors other than rural residence and farm status. In particular, rural and farm families were less likely to be headed by large firm workers who had better access to employment-related coverage. They were also less likely to have high incomes, reducing their ability to purchase other types of private coverage, and less likely to have highly educated heads who tended to make more informed decisions about health insurance.

Once the different characteristics of rural residents and farm family members were taken into account, neither group had significantly lower odds of health insurance coverage. In fact, nuclear kin from rural areas and extended kin from farm families were both found to have higher odds of coverage than other persons.

Rural residents and farm family members also tended to have different types of health insurance coverage than other Americans. In particular, they were less likely to have employment-related group coverage, and more likely to have private coverage obtained outside the workplace. This difference was important because group coverage was generally less expensive and subject to fewer restrictions than other types of private coverage. The financial implications of the difference in types of coverage merits more attention, particularly in the case of farm families.

The results of this study must be interpreted with some caution. Several factors known to affect health insurance coverage could not be accurately measured, and were not incorporated in the empirical model. These factors included the personal health risks that might cause health insurers to deny coverage, as well as family eligibility for several important categories of public coverage. Inclusion of these factors in the model could alter some of the results. The findings from this study could also differ from studies based on a different definition of insured persons than that used by the CPS.

It is useful to know that the lower rate of health insurance coverage among rural residents and farm family members was not directly due to rural residence or farm status. A national policy to expand health insurance coverage is now evolving, but the circumstances of rural and farm families have received relatively little attention. The evidence examined here suggests that rural and farm families were not subject to special disadvantages in obtaining health insurance, and should therefore be as likely as other Americans to benefit from new measures increasing coverage.

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APPENDIX I: DEFINITION OF SELECTED VARIABLES

Employment Status of Family Head/Spouse

- Large Firm Worker: Family head and/or spouse (including persons aged 65+) was full-time (35+ hours per week), full year (50+ weeks) worker during 1989, with longest job for large firm with 25 or more employees.
- Other Worker: Family head and/or spouse worked for one or more hours per week for one or more weeks during 1989; neither was full-time, full year worker for large firm.
- Non-Worker: Family head and spouse did not work during 1989.

Family Income

- Poor: Family income below 100% of poverty level.
- Near Poor: Family income 100-199% of poverty level.
- Middle Income: Family income 200-399% of poverty level.
- High Income: Family income 400% or more of poverty level.

Region

- Northeast: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont
- Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin
- South: Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, West Virginia
- West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, Wyoming

Dependent Student Status (Extended Kin Only)

- Dependent Student: Unmarried child of family head aged 18-24 not working for 1+ weeks during 1989 due to school attendance.
- All Other Persons

TABLE 1: CHARACTERISTICS OF FAMILY MEMBERS UNDER AGE 65 BY KINSHIP CATEGORY, 1989

Characteristic	All Family Members (%)	Kinship Category*	
		Nuclear Kin (%)	Extended Kin (%)
<u>TOTAL</u>	100.0	100.0	100.0
<u>Residence</u>			
Urban	77.3	76.6	80.9
Rural	22.7	23.4	19.1
<u>Farm Status</u>			
Non-Farm	98.4	98.3	98.7
Farm	1.6	1.7	1.3
<u>Family Head/Spouse Employment</u>			
Large Firm Worker	59.2	61.3	48.3
Other Worker	30.8	31.1	29.4
Non-Worker	10.0	7.7	22.3
<u>Family Income</u>			
Poor	12.0	12.1	11.7
Near-Poor	16.8	16.8	16.8
Middle Income	35.0	35.4	33.0
High Income	36.2	35.7	38.5
<u>Family Head Education</u>			
Less Than 12 Years Education	20.5	18.1	33.2
12 Years Education	37.5	37.8	36.1
13+ Years Education	42.0	44.1	30.7
<u>Family Type</u>			
Married Couple	80.2	84.3	58.5
Male Family Head	3.8	2.7	9.9
Female Family Head	16.0	13.0	31.7
<u>Region</u>			
Northeast	20.4	19.9	23.1
Midwest	24.2	24.7	21.7
South	34.5	34.4	35.0
West	20.9	21.0	20.1
<u>Age</u>			
0-17 Years	33.3	37.0	14.0
18-29 Years	19.5	11.1	63.8
30-49 Years	32.7	35.6	17.6
50+ Years	14.5	16.3	4.5
<u>Sex</u>			
Male	49.0	47.6	56.1
Female	51.0	52.4	43.9
<u>Race</u>			
White, Non-Hispanic	74.6	76.5	63.5
Black, Non-Hispanic	12.6	11.2	20.4
Hispanic	9.3	8.8	12.0
Other Race	3.5	3.6	4.1
<u>Extended Kin Employment</u>			
Large Firm Worker	na	na	23.6
Other Worker	na	na	52.0
Non-Worker	na	na	24.5
<u>Extended Kin Education</u>			
Less Than 12 Years Education	na	na	29.9
12 Years Education	na	na	39.7
13+ Years Education	na	na	30.4
<u>Extended Kin Student Dependent</u>			
Student Dependent	na	na	79.6
Other	na	na	20.4
<u>Number of Persons (000s)</u>	189,789	159,790	29,998

NOTE: Percentages may not total to 100.0 due to rounding.

* Nuclear kin include family household heads, spouses, and children under age 18; extended kin include older children and other relatives of heads.

TABLE 2: HEALTH INSURANCE COVERAGE OF FAMILY MEMBERS UNDER AGE 65
BY KINSHIP CATEGORY, 1989

Characteristic	All Family Members	Proportion With Health Insurance (Percent)	
		Kinship Category*	
		Nuclear Kin	Extended Kin
<u>Total</u>	85.8	88.6	70.7
<u>Residence</u>			
Urban	86.1	89.1	71.0
Rural	84.5	86.9	69.4
<u>Farm Status</u>			
Non-Farm	85.8	88.6	70.7
Farm	84.1	85.6	74.3
<u>Family Head/Spouse Employment</u>			
Large Firm Worker	92.4	94.6	77.5
Other Worker	75.0	77.2	62.8
Non-Worker	79.5	86.7	66.4
<u>Family Income</u>			
Poor	69.0	72.0	52.5
Near-Poor	72.7	75.8	56.1
Middle Income	88.8	92.0	70.6
High Income	94.5	96.9	82.7
<u>Family Head Education</u>			
Less Than 12 Years Education	71.4	75.0	61.1
12 Years Education	86.0	88.6	71.8
13+ Years Education	92.5	94.2	79.8
<u>Family Type</u>			
Married Couple	88.0	89.8	74.4
Male Family Head	68.8	74.7	60.4
Female Family Head	78.6	83.8	67.1
<u>Region</u>			
Northeast	89.2	92.1	76.1
Midwest	90.4	92.5	77.6
South	82.2	85.2	66.2
West	83.0	86.3	65.0
<u>Age</u>			
0-17 Years	86.9	88.1	71.1
18-29 Years	78.0	83.8	72.6
30-49 Years	87.8	89.9	64.6
50+ Years	88.9	90.1	66.3
<u>Sex</u>			
Male	85.0	88.8	67.9
Female	86.5	88.4	74.3
<u>Race</u>			
White, Non-Hispanic	89.4	91.3	76.3
Black, Non-Hispanic	80.4	85.3	66.0
Hispanic	66.1	70.6	49.7
Other Race	80.5	84.2	68.9
<u>Extended Kin Employment</u>			
Large Firm Worker	na	na	82.7
Other Worker	na	na	67.4
Non-Worker	na	na	66.2
<u>Extended Kin Education</u>			
Less Than 12 Years Education	na	na	61.6
12 Years Education	na	na	72.3
13+ Years Education	na	na	77.6
<u>Extended Kin Student Dependent</u>			
Student Dependent	na	na	84.2
Other	na	na	67.2

* Nuclear kin include family household heads, spouses, and children under age 18; extended kin include older children and other relatives of heads.

TABLE 3: LOGIT REGRESSION ESTIMATES OF FACTORS INFLUENCING THE ODDS OF HEALTH INSURANCE COVERAGE OF FAMILY MEMBERS UNDER AGE 65, 1989

Variable	Odds Ratio	
	Nuclear Kin	Extended Kin
Rural	1.118**	1.048
Farm	1.046	1.487**
Large Firm Worker ¹	.899	.853**
Other Worker ¹	.257**	.610**
Near Poor ²	.994	1.240**
Middle Income ²	2.640**	2.039**
High Income ²	5.855**	3.361**
12 Years Education ³	1.580**	1.093*
13+ Years Education ³	2.305**	1.382**
Male Family Head ⁴	.437**	.691**
Female Family Head ⁴	1.310**	.986
Midwest ⁵	1.136*	1.171**
South ⁵	.609**	.794**
West ⁵	.782**	.810**
Age 0-17 Years ⁶	1.355**	2.510**
Age 18-29 Years ⁶	.834*	1.212**
Age 50+ Years ⁶	1.112*	1.235**
Female	.945	1.420**
Black, Non-Hispanic ⁷	.833**	.864**
Hispanic ⁷	.436**	.483**
Other Race ⁷	.531**	.803**
Extended Kin: Large Firm Worker ⁸	-	2.178**
Extended Kin: Other Worker ⁸	-	.764**
Extended Kin: 12 Years Education ⁹	-	1.154**
Extended Kin: 13+ Years Education ⁹	-	1.107*
Extended Kin: Student Dependent	-	2.878**
CONSTANT	1.7779	-.1248
PSEUDO R ² ^a	.533	.636

** P < .05

* P < .01

NOTE: Omitted categories are: ¹ Non-worker; ² Poor; ³ Less Than 12 Years Education; ⁴ Married Couple Family; ⁵ Northeast; ⁶ Age 30-49 Years; ⁷ White, Non-Hispanic; ⁸ Extended Kin: Non-Worker; and ⁹ Extended Kin: Less Than 12 Years Education.

^a Pseudo R² defined as C/(C + N), where C = -2(Log Likelihood Ratio), and N = number of cases.

FIGURE 1: TYPE OF HEALTH INSURANCE
COVERAGE BY RESIDENCE AND KINSHIP
CATEGORY, 1989

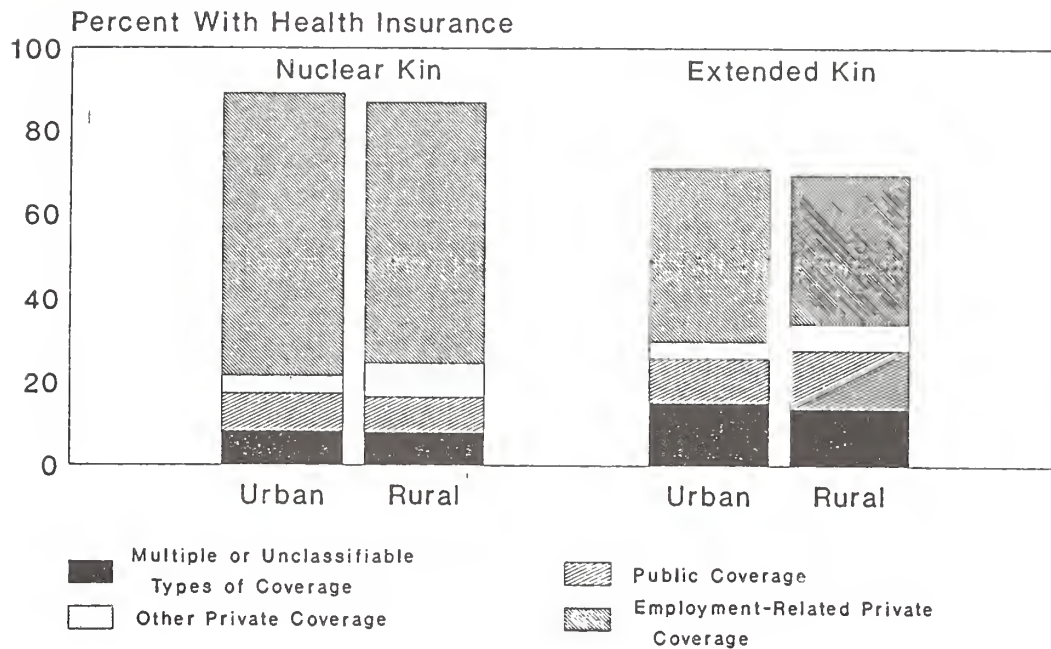
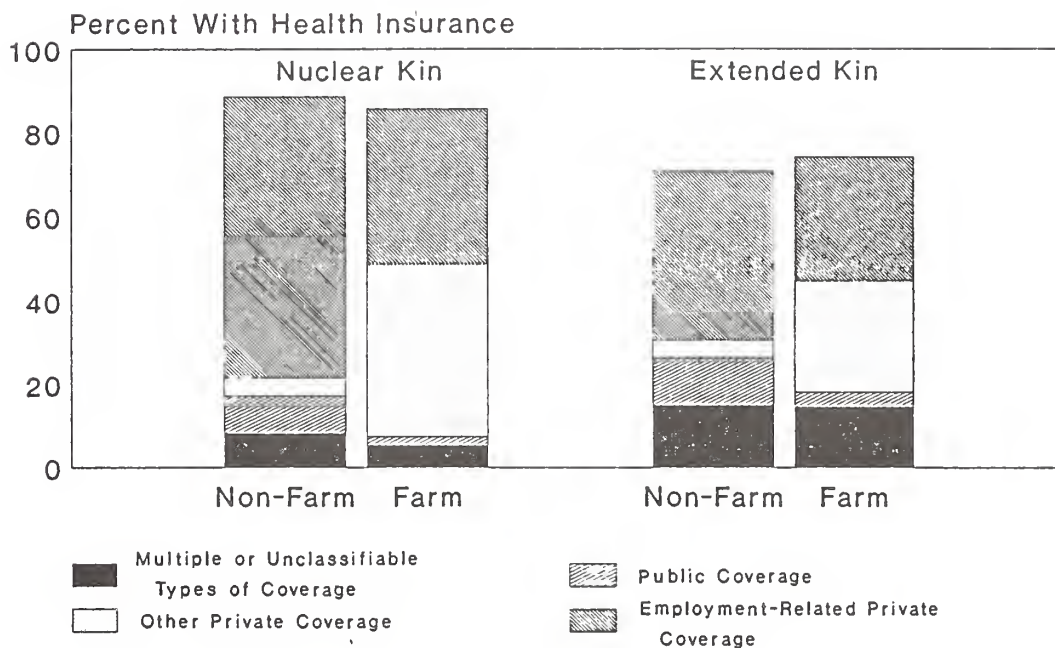


FIGURE 2: TYPE OF HEALTH INSURANCE
COVERAGE BY FARM STATUS AND KINSHIP
CATEGORY, 1989



Outlook '93

For Release: Wednesday, December 2, 1992

PLIGHT OF YOUNG CHILDREN: EXTENSION'S COMMITMENT**Jane Schuchardt****National Program Leader, Family Resource Management
Extension Service, U.S. Department of Agriculture**

When families are strong, stable, and loving, children have a sound basis for becoming caring and competent adults Government, in partnership with private community organizations, [should] develop and expand community-based family support programs to provide parents with the knowledge, skills, and support they need to raise their children ("Beyond Rhetoric: A New American Agenda for Children," final report of the National Commission on Children, 1991)

Poor children and families in America are all of us--white, black, brown, hard working, two-parent and single-parent families, mothers struggling to get adequate child support, fathers and mothers struggling to earn decent wages as well as the minority of poor who depend on welfare It is time to honor our pro-family rhetoric with action (Marian Wright Edelman, president of the Children's Defense Fund (CDF), speaking about the CDF report "Child Poverty in America," 1991)

No sector of the United States is void of comment about the status of American children. The examples above are from federal government and a child advocacy group. Educators, service providers, employers, and families themselves all fear for our children's well-being, and consequently, the Nation's future. The concern is well founded¹.

Infant mortality in the United States is 10 deaths per 1,000 live births, worse than 19 other industrialized nations of the world. Many children who do survive lack the quality of life that supports optimum development.

Premature birth and low birth weight infants have nearly 10 times the risk of severe developmental problems such as blindness, deafness, and retardation and two to three times the risk of having problems in school. Such births are most often associated with

late or no prenatal care, inadequate maternal weight gain, poor nutrition, and smoking and substance abuse.

Reported child abuse and neglect is up 10 percent since 1989. Children from families whose income is less than \$15,000 are five times more likely to be mistreated than those from higher income families.

Poverty is a way of life for about one in four children under age 6. Poor children often lack basic needs such as adequate nutrition, acceptable housing, and enriching educational opportunities. They are at increased risk of poor health, poor nutrition, educational under-achievement, illiteracy, developmental delays, ultimate social deviance, child abuse and neglect, and inadequate child care.

Early intervention has been well established as a critical factor in successful programs for at-risk children. These programs work through parents and focus on outcomes of success, productivity, and self sufficiency rather than failure and frustration. Such preventive education is cost-effective. It is estimated that for every dollar spent on prevention, \$3-4 is saved in crisis intervention and treatment programs.

Practical Response to an Urgent Problem

Strengthening the American family, the backbone institution of a healthy Nation, has long been a goal of the Cooperative Extension System (CES)². Programs in money management techniques, child care provider training, wise nutrition choices, family communications, parent effectiveness, and youth self-esteem have helped families not just survive, but thrive.

As our Nation transitions to a new century, issues faced by all families, but especially those of limited resources, drive economic, social, and political agendas. Early in the 1990s, Extension Service, U.S. Department of Agriculture (ES-USDA), the federal partner in the CES, recognized the need for increased commitment to limited resource families³. A report called *Reaching Limited Resource Audiences* outlined 13 recommendations for Extension target audiences, programs, and staff training and development⁴. Many of these recommendations are embodied in the CES National Initiative, *Plight of Young Children*, which began in September 1991.

Extension's Commitment

Via the National Initiative, *Plight of Young Children*, the CES is dedicating resources and

expertise to the educational needs of limited resource families with young children, prenatal to five. Targeting the young child recognizes the importance of the early years for optimal development, school readiness, and lifelong success. The vision:

One generation of children, raised to be physically, intellectually, socially, and emotionally prepared for school and life. . . . These children will become the first link in a new chain of hope for a positive future ("Plight of Young Children: A Recommended Agenda for the CES," Washington, DC: ES-USDA, September 1991, p.6).

The CES recognizes this vision cannot be reached alone. To be successful, preventive education must be backed by supportive policy intervention and linked with caring communities. The CES has a 77-year history with the core subjects of this Initiative-- money management, nutrition and health, and parenting.

From this experience, Extension educators have learned the following.

- Families that achieve financial goals, regardless how small when measured in dollars, feel an increased sense of control over their money and their lives.
- Prenatal care and good nutrition during pregnancy reduces the likelihood of low birth weight and premature births.
- By understanding early developmental changes, parents can revel in their children's actions rather than be frustrated by them.

What is different about this new Initiative for Extension is not the subject matter, but the approach. It requires **collaboration** at the **community level** to provide **comprehensive programs** that are **client-centered**. Each of these components is critical for behavioral change among limited resource families⁵.

Collaboration. This means putting Extension in the leadership role as a catalyst for change. By building coalitions, at local, state, and federal levels, there is a bridging of traditional, professional, and bureaucratic boundaries among organizations and agencies.

Examples of linkages that have been formed at the federal level are with the U.S. Department of Health and Human Services (Healthy Start, Head Start); U.S. Department of Housing and Urban Development; U.S. Department of Agriculture Food and Nutrition Service (e.g., Food Stamps, Day Care Food Services, WIC); and the Internal Revenue Service. At the state and local levels, agencies, organizations, health care providers, banks and credit unions, employers, and churches often are involved.

Community-based. This characteristic is crucial for coalition building in behalf of families with young children. It also is an appropriate term for the program delivery location. Programs are centered in facilities that are familiar, comfortable for, and frequented by limited resource families with young children (e.g., homes, schools, community centers).

Comprehensive. Limited resource families must have access to comprehensive programs including such topics as money management, nutrition and health, and parent education. "Comprehensive" does not mean that one program, or even one organization, offers everything, but that there is an easy method for pinpointing the major need and directing the family to the right place.

Client-centered. The family, in concert with an Extension educator, determines its needs and goals. A teacher-learner partnership is formed with the family to define how, when, and what education is done *with* them rather than *for* them.

Expected Outcomes

Extension's educational agenda for children seeks to ensure a healthy infancy; increase families' competencies in basic nutrition, money management, and parenting; and build communities supportive of children and families. Specific, measurable outcomes are to:

- reduce infant mortality;
- decrease incidence of low birth weight babies;
- reach a family financial goal (e.g., savings for an emergency);
- become more effective parents;
- improve school success by at-risk children;
- engage in more parent-school-community interaction;
- heighten awareness within communities about the critical needs of children and their families; and
- form public policy coalitions in behalf of children and their families.

Successes

Preventive education for families with children pre-natal to 5 does make a difference. The programs described below all have resulted in behavioral change for parents and positive effects for their young children. It is the goal of *Plight of Young Children* to give each family access to programs similar to these. Cross-referrals among programs in the same community makes the outreach comprehensive.

Program Showcase: Money Management

In Illinois, Extension collaborates with the Internal Revenue Service to produce a workbook called *The Easy Way to Prepare Your 19xx Individual Income Tax Return*. Training is provided to Extension paraprofessionals and volunteers, plus representatives from housing authorities, school parents groups, church groups, libraries, women's shelters, Salvation Army, and community action groups.

Then the message is taken to low income taxpayers. The objectives are to increase awareness of the responsibility to participate in the income tax system, to recover refunds and credits (*i.e.*, Earned Income Credit) due them, and to make good decisions about the use of extra disposable income.

For a 1991 impact study, 248 participants in the taxpayer program were surveyed. Of the 83 percent who said they would receive a tax refund, 163 reported the amount. It totaled \$111,851 or an average of \$600 per person. This figure is more meaningful when one knows that 65 percent of the participants have an annual income under \$6,000.

Through this program, there has been a significant impact on the economic well-being of the families and their communities. Families have been able to pay bills, continue their education, obtain vocational training, improve their housing, and establish savings accounts. Feeling a greater sense of control over financial affairs encourages confidence in other household responsibilities, including child rearing.

Program Showcase: Nutrition and Health

The *Have a Healthy Baby* Extension program in Indiana strives to reduce infant mortality and decrease the incidence of low birth weight babies. Via videotapes and experiential learning, high risk pregnant teens and adults learned about the need for early prenatal care. They see the effect of certain life style choices, such as eating behaviors, smoking, and use of alcohol and drugs, on the unborn baby.

Programs are conducted in clinics, community centers, homes, schools, churches, and agency offices in groups or one-to-one. Collaborating agencies include March of Dimes; Women, Infants and Children (WIC); Healthy Mothers, Healthy Babies Coalition; National Center for Education in Maternal and Child Health; well-baby clinics, and schools.

Data have been collected on more than half of the 1,168 women reached with the program. Of those 619 pregnancies, 2.58 percent resulted in low birth weight babies. The Indiana average is 6.6 percent.

Program Showcase: Parent Education

Minimizing abusive and/or neglectful behavior toward children and increasing a child's potential for healthy development are the goals of the *Parent Education for Adults and*

Children of Hunterdon (PEACH) Extension program in Hunterdon, New Jersey. The approach combines parenting classes, individual consultations, and parent discussion groups for at-risk families.

Referrals comes from Family Court, Catholic Charities, Community Mental Health, Youth Services, and Women's Crisis. Impact data shows 90 percent of participants increased their confidence in parenting after participation in the program. A comment from one parents says it best: "I look at my daughter with a different eye--I look for positives, not negatives."

Summary

People are this country's greatest resource. To neglect the critical needs of families, especially those rearing tomorrow's workers, leaders, and parents, could bring a 21st century marked by deeper societal and economic problems than those experienced today.

Through efforts of the National Initiative, *Plight of Young Children*, Extension teaches skills to parents that positively affect the early years of their children. The cornerstone of the Initiative is access by limited resource families with young children to a comprehensive educational program. Core subjects are money management, nutrition and health, and parenting. Other characteristics of this effort are its emphasis on collaboration and coalition-building at the community level, the client-centered approach, and delivery through trained paraprofessionals and volunteers from the families' communities.

Endnotes

¹For a review of the statistics and trends related to status of American children, see the Cooperative Extension System White Paper, *The Plight of American Children: Prenatal to Age Five* (Washington, DC: Extension Service, U.S. Department of Agriculture, May 1991, 17 pp). The 26-page paper summarizes research by a team of experts in family resource management, nutrition, and human development. It includes an extensive reference list.

²The Cooperative Extension System (CES) is a national, publically funded organization with a mission of helping people improve their lives through an educational process that uses scientific knowledge focused on issues and needs. This public nonformal educational network combines the expertise and resources of federal, state, and local governments. The partners in this unique system are:

- the Extension Service, U.S. Department of Agriculture, Washington, DC;
- Extension professionals at land-grant universities throughout the United States and its territories; and
- Extension professionals in nearly all the Nation's 3,150 counties.

³The *Reaching Limited Resource Audiences* report (see Endnote 4 for citation) defines limited resource families as those with "limited income and/or limited education struggling to maintain supportive environments."

⁴The report, *Reaching Limited Resource Audiences: Recommendations for Extension Action in the 1990's* (Washington, DC: Extension Service, U.S. Department of Agriculture, April 1991, 17 pp.), was prepared by the Limited Resource Audiences Committee, Chaired by Ruth Allen, Ph.D., Cornell University. Copies are available from Home Economics and Human Nutrition, ES-USDA, 3444-S, Washington, DC 20250-0900. Quantities are limited.

⁵For a more thorough examination of Extension's work with limited resource families, see the discussion paper *Extension Family Programs in a New Era: 10 Critical Questions* (Washington, DC: Extension Service, U.S. Department of Agriculture, November 1992, 12 pp.).

Outlook '93**For Release: Wednesday, December 2, 1992****OUTLOOK FOR U.S. TOBACCO**

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The outlook for U.S. grown tobacco during the mid-1990's is less optimistic than during the late 1980's and early 1990's. During the late 1980's and early 1990's leaf production rose and excess supplies were depleted. Also, cigarette production rose because of big increases in cigarette exports. But, cigarette export growth has slowed and domestic consumption continues to decline. In addition, cigarette manufacturers are shifting to cheaper, imported leaf.

U.S. cigarette production in 1992 will likely decline for the second consecutive year after exceeding 700 billion units in 1990. The fall-off in cigarette production results from a continuing decline in domestic consumption and a leveling off of exports. Domestic consumption is falling because of periodic price increases, additional and more stringent smoking restrictions, and declining social acceptance of tobacco use. Overseas markets are experiencing similar conditions.

With lower demand for cigarettes and substitution of foreign for domestic leaf, U.S. tobacco production will likely fall in 1993. After a sharp drop from 1984 to 1986, leaf production rose 46 percent from 1986 to 1992.

The U.S. tobacco outlook for 1992/93 is highlighted by larger domestic supplies. Compared with a year earlier, flue-cured prices averaged about the same and burley prices may do likewise. The steady prices resulted from increased support prices despite marketings in excess of estimated disappearance.

After falling in 1991/92, use may stabilize in 1992/93. U.S. production in 1992 is up 1.5 percent from last year. Together with larger production, higher carryin stocks increased supplies about 2 percent to 3.9 billion pounds, with increases in both major kinds--burley and flue-cured.

The size of the 1993 crop will depend in part on USDA's decision on quotas, which must be made by December 15 for flue-cured, February 1 for burley, and March 1 for other kinds. The declining use and larger supplies of both flue-cured and burley suggest that basic quotas might be lowered. However, the key for both flue-cured and burley is the level of manufacturer's buying intentions. Effective quotas will likely decline for both burley and flue-cured.

Production of all tobacco will likely decline next year. Prices in 1993 are difficult to predict, but depend heavily on the quality of the crop, support levels, the size of the carryover and current crop, and the level of domestic and foreign demand for cigarettes.

U.S. Cigarette Sales Falling, Export Growth Slowing

Cigarettes are the dominant product of the tobacco industry in the United States and most other countries. With a slowdown in export growth, U.S. output will likely decline from the 695 billion in 1991 because U.S. cigarette consumption may fall about 2 percent this year. Consumption per person 18 and over may drop by 73 cigarettes (4 packs of 20) from 2,713 to 2,640. This would be the lowest consumption since 1942 and 39 percent below the 1963 peak. During the 1970's cigarette smokers shifted toward low-tar brands. However, there was a reversal after 1980. From 1981 to 1985 the low-tar proportion (15 milligrams of tar or less) fell from 60 to 52 percent of domestic sales, but it rose to 59 percent in 1991 where it may remain this year.

Despite an increase in the smoking age population, total consumption of cigarettes is likely to decline again in 1993 and per capita consumption is also likely to decline. The primary reasons for the expected decline are price hikes because of increased manufacturer costs and taxes, and efforts to maintain or enhance profits. The federal excise tax remained at 20 cents but will increase by 4 cents to 24 cents a pack on January 1, 1993. In 1992, six States and the District of Columbia raised excise taxes an average of 8 cents a pack of 20. State taxes now vary from 2.5 cents a pack in Virginia to 50 cents in Hawaii. Massachusetts will increase its tax to 51 cents on January 1. Many cities and other local governments also tax cigarettes, and four-fifths of the States now impose sales taxes on cigarettes.

Wholesale cigarette prices rose 9 percent from November 1991 to July 1992. A further increase will likely occur soon. Retail prices rose 9.5 percent from October 1991 to October 1992, the smallest increase in 6 years, but still nearly 3 times the rate of increase in overall consumer prices during the same period. As prices have risen, sales of generic and value-priced cigarettes (priced 15 to 50 percent lower than standard brands) have risen and now account for around 30 percent of U.S. cigarette sales.

Antismoking activity, including legislation, continues to affect the industry. Forty-six States and the District of Columbia have laws that either prohibit smoking in certain places or segregate smokers and nonsmokers. Seventeen States regulate smoking in the workplace of both private and government employees and 38 States regulate smoking in government workplaces. Also, a large number of counties and cities have some smoking restrictions. The U.S. Department of Health and Human Services and voluntary health agencies continue to discourage smoking. The cumulative effect of publicity and ordinances on smoking is uncertain, although it almost surely accounts for some of the downward trend in per capita consumption.

The Omnibus Budget Reconciliation Act of 1990 further increases U.S. Federal excise taxes another 4 cents to 24 cents a pack January 1, 1993. In addition a number of bills were introduced in the last Congress that affected cigarette smoking, but none became law. They included: 1) increasing the Federal excise tax by substantially more than already scheduled; and 2) limiting tax write-offs for advertising tobacco products.

Changes in Tobacco Per Cigarette Affects Total Use

Tobacco use in cigarettes remained relatively constant during the 1970's and in 1980 and 1981, despite the gain in cigarette output. For many years, manufacturers could economize in leaf use as they shifted to filtertip brands and used the whole leaf. Later, manufacturers began using various leaf expansion processes and in recent years have used more imported tobacco to stabilize costs. With cigarette production declines from 1981 to 1986, total leaf use fell, but production hikes in 1987 and 1988 boosted leaf use. Leaf use fell in 1989, rose in 1990 because of an increase in cigarette production, and rose again in 1991 despite a fall in cigarette production. However, leaf use in 1992 will likely decline.

U. S. cigarette manufacturers used an estimated 1,233 million pounds of tobacco (unstemmed processing weight) in cigarettes in 1991. This was slightly above 1990 despite a reduction in cigarette production because leaf use per cigarette climbed. This calendar year, with cigarette production down, leaf use may decline.

Manufacturers used an estimated 1.775 pounds of tobacco (unstemmed processing weight) per 1,000 cigarettes produced in 1991, about 2.5 percent above a year earlier, but considerably below the levels of 15 to 20 years ago. Domestic flue-cured accounts for 35 percent, burley 29 percent, and Maryland 2 percent. Foreign-grown was 34 percent; twenty years earlier it was 15 percent.

Consumption of Other Products Mixed

Consumption of large cigars will likely decline about 4 percent to 2.1 billion in 1992. Production of little cigars--less than 3 pounds per thousand--may increase for the third consecutive year. Large cigar consumption in 1992 is expected to continue the decline that started in 1970. Smoking tobacco consumption continues to fall to record lows annually.

Snuff consumption will likely increase for the fifth straight year in 1992 after declining for two consecutive years. Moist use is rising but dry use continues to decline. Chewing consumption may not change much in 1992 after rising slightly in 1991.

The recent rise in snuff and chewing consumption probably results from substitution of these products because of increased smoking restrictions. Effective industry promotion, and the possibly waning impact of warning labels, tax hikes, and negative publicity are additional factors behind the increased consumption.

U.S. Tobacco Crop Larger

Tobacco production is up this year in the United States because acreage is up. Despite higher price supports, with a relatively good quality crop, flue-cured auction prices averaged about the same as a year earlier. Combined with larger marketings, flue-cured cash receipts from the 1992 crop were up about 2 percent. Production costs were higher, but the combined no-net cost and marketing assessment was unchanged from the 1 cent a pound assessment of a year earlier.

As of November 1, the tobacco crop was forecast at 1.69 billion pounds, up 1.5 percent from a year earlier. Total supplies for the 1991/92 marketing year were up about 2 percent because of larger production and carryin.

Price supports for all kinds of tobacco are higher this season. Burley auctions opened November 23. This season's average prices may be near that of a year earlier. Cash receipts for the 1992 burley crop may increase 5 to 10 percent.

As of October 1, grower cooperatives held about 254 million pounds of tobacco (farm sales weight and excluding 1992 flue-cured receipts), up about 6 percent or 14 million pounds from a year earlier. Unsold loan stocks of 198 million pounds were up about 41 percent from a year earlier. Sales of old-crop loan stocks have slowed as inventories have declined and cigarette manufacturers have shifted to using more foreign-grown leaf. Also, special ("buyout") sales authorized by 1986 tobacco legislation have been completed--2 years ahead of schedule.

The flue-cured auction season ended on November 9 with prices averaging \$1.728, about 0.3 cent above a year earlier. About 82 million pounds were placed under loan; about 65 percent above a year earlier and the largest in 7 years.

Government price support is mandatory for tobacco produced under marketing quotas. Support levels for 1993 have not been set although preliminary figures indicate the flue-cured support will increase between 1.7 and 2.6 cents a pound.

Flue-cured and burley price supports are the level for the preceding year adjusted by changes in the 5-year moving average of prices (two-thirds weight) and changes in the cost of production index (one-third weight). Costs include general variable expenditures, but exclude costs of land, quota, risk, overhead, management, marketing contributions, and other costs not directly related to the production of tobacco.

Marketings from the 1992 flue-cured crop and unsold 1991 production were about 2 percent above last year's marketings. Together with a larger carryover, flue-cured supplies for 1992/93 are about 1 percent above last season. The flue-cured effective quota was 1 percent higher this year. Because of excess production in 1991, 50 to 55 million pounds of 1991 crop tobacco were sold in 1992. Some growers have tobacco in excess of their penalty free quota (103 percent of the effective quota can be marketed without penalty) this year to carry into the 1993 season.

Under the acreage-poundage program, USDA is required to announce the national marketing quota for the 1993 crop of flue-cured tobacco by December 15, 1992. The 1992 basic quota was 891 million pounds, above prospective use. After declining for 10 years, supplies are up this season and represent about 2.4 years use. Because this season's marketings are near 1992's effective quota, the effective quota for 1993 will be near the basic quota.

Supplies of burley tobacco are up this season for the first time since 1984. Supplies represent about 2.3 years use. The 1992/93 supply of burley tobacco is about 4 percent above last season.

Carryover burley stocks on October 1 were 2 percent above a year earlier because use fell below 1991 production. This year's crop increased 6 percent from last year. Acreage is up 4 percent and yields are up 2 percent.

Last season, disappearance of flue-cured tobacco totaled 875 million pounds, about 14 percent lower than the previous year. Domestic use fell but exports were about unchanged. The 23-percent decrease in domestic disappearance reflects decreased cigarette output and substitution of imported leaf and stems for domestic leaf. Despite lower cigarette production, the typical year to year variation suggests domestic disappearance during 1992/93 might rise slightly from 1991/92's low level.

With larger supplies, the weak dollar, and this year's larger crop, exports may increase a little. However, U.S. exports continue to be hampered by stagnant or declining cigarette consumption in major importing countries, reduced leaf use per cigarette, quotas and tariffs that discriminate against U.S. tobacco, and ample world supplies.

During the year ending September 30, 1992, burley disappearance totaled 644 million pounds, 4.5 percent below the previous year. Domestic use was down but exports were up. Domestic use was down because of reduced cigarette production and substitution of imported leaf and stems for domestic leaf. Exports are up because of a larger and relatively good quality 1991 crop of burley and growing demand for American blended cigarettes throughout the world.

Total use of burley may decline further in 1992/93. Domestic use will likely decline but exports could stay about the same.

For both flue-cured and burley tobacco, legislation requires that the national quota be based on:

- 1) intended purchases by cigarette manufacturers,
- 2) average annual exports for the 3 preceding years, and
- 3) the amount of tobacco needed to attain the specified reserve stock level (15 percent of the basic quota). USDA's discretion for setting the quota is limited to no more than 103 percent or less than 97 percent of the amount determined by manufacturers' needs and exports, and the reserve stock level. Any quota reduction is limited to a maximum of 10 percent in 1993. Beginning in 1994, no limit applies.

The reserve stock adjustment may lower both the basic burley and flue-cured quotas in 1993. However, the 1993 quota levels depend heavily on purchase intentions of manufacturers which represent the industry's assessments of future stock requirements. Also, the effective burley and flue-cured quotas will likely fall because the carryover of under-marketings are expected to decline.

Among other types of tobacco, supplies of Maryland, fire-cured, and dark air-cured are down. Cigar filler and binder supplies are up.

Producer referendums will be held in early 1993 to determine if growers of Ohio cigar filler and Wisconsin cigar binder (types 42-44 and types 54-55) and Puerto Rican cigar filler (type 46) desire acreage allotments for their next three crops. Producers of flue-cured, burley, dark fire- and dark air-cured tobacco approved marketing quotas in previous referenda. Maryland, Pennsylvania filler (type 41), and Connecticut cigar binder (types 51-52) voted against quotas in previous referenda.

A Look Ahead

U.S. tobacco production in 1993 will likely decline from this year which was the highest since 1984. Supplies of leaf have increased, cigarette production is declining, and cigarette manufacturers are substituting cheaper foreign-grown for domestic leaf.

Continued large hikes in cigarette wholesale prices, prospects for higher taxes, more and more smoking restrictions, declining social acceptability of tobacco use in the United States, and antismoking activities will almost surely lead to further reductions in domestic cigarette consumption. Cigarette consumption will likely fall an average of between 2 and 3 percent a year over the next several years. In addition, cigarette export growth is slowing. The decline in domestic cigarette consumption, a slowdown in the rate of increase in cigarette exports, and greater substitution of foreign-produced for domestically grown tobacco will likely result in declining U.S. cigarette and leaf production in the mid-1990's.

Outlook '93

For Release: Wednesday, December 2, 1992

OUTLOOK FOR U.S. TOBACCO EXPORTS

Mr. J.T. Bunn

Executive Vice President

Leaf Tobacco Exporters Association, Raleigh, NC

I'm very pleased to be with you today to talk about the outlook for tobacco exports in the Nineties.

Today, you and I are faced with new economic and political realities, with changing market demands. And we have to recognize and understand these changes in order to plan wisely for tomorrow. During the Eighties, the U.S. tobacco industry reaped the economic benefits of an expanding world market. Leaf exports gained some lost ground and cigarette exports soared – both a direct result of the growing demand for the American-blend style of cigarette around the world. But what's in store for us in the Nineties?

Today, when we look at the prospects for growth in the U.S. tobacco industry, we find four inter-related subjects are of key importance: one, the economic realities of the new geopolitical world order; two, the significance of international tobacco trade trends; three, how decisions in Washington affect our ability to compete in the world market; and, four, growing consumer preferences for American-blend cigarettes.

To assess our potential, let's look first at what the political changes in the former Soviet-bloc mean for our industry.

The newly independent nations of Europe offer the world one of its most challenging economic opportunities of the century. It is vital that the industrialized democracies of the Western world do all they can to help build free-market economies in the Commonwealth of Independent States and in the nations of eastern Europe – Hungary, Bulgaria, Poland, Czechoslovakia. This certainly will not be easy to do, particularly during these times of global recession, but we must do it if we're to ensure economic growth for the future.

As the leading nation of the free world – a world which is now much bigger than it used to be – the United States must take the lead. And, as the oldest industry in the United States, the tobacco industry will play an important role in helping build sound free-market economies in these former socialist nations.

U.S.-based tobacco firms have already made significant investments in these newly democratic countries, buying factories and setting up joint ventures. But results will not come quickly. Benefiting from long-term investment requires patience, flexibility, resources, and sound management. In these new markets especially, it will require the flexibility to consider options such

as barter and countertrade. It will require the ability to deal with monetary limitations. And it will require full support from our government to turn these market opportunities into rewarding investments.

Let me give you one example. Recently, our tobacco trade association received an inquiry from a broker selling to the CIS for a continuous order of 5,000 metric tons a month of U.S. tobacco. Top price the buyer would pay: \$800 a tonne – or about 40¢ a pound! Clearly, for the near-term, **price** is a major obstacle to our entry into this market. Short- to mid-term, the CIS simply can't afford U.S. leaf. Not unless we can make credit arrangements to fit the economic conditions of the region.

Yet, as we make plans to take advantage of these new opportunities, we must not overlook the fact that every one of these new markets is also open to our competitors.

The U.S. leaf tobacco industry can be a major player. We want to provide U.S. leaf to these new nations. But unless we have the full support of the U.S. government, the competition could prove devastating. Why do I say that? Our competitors in these markets have access to credit programs and market development funding from their governments. If we do not have the same support from our own government, we cannot hope to compete effectively. Without government policy support, we will end up with only a token share of these new markets.

When I look at what the U.S. government has done recently to thwart our tobacco export efforts, I begin to think the tobacco industry should apply for assistance under a special version of the American's With Disabilities Act. Why? The U.S. government clearly discriminates against tobacco when it comes to equal access to market growth opportunities. I'm not talking about the social pressures against smoking here. I'm talking about the U.S. Congress and the U.S. Administration. The tobacco industry as a business is being persecuted because the government doesn't have the backbone to stand up against mis-guided public sentiment and special-interest politics.

Look at just two events of recent months:

One, Congress has decided that tobacco will not receive funds to promote exports in 1993. **All other** agricultural commodities are eligible for these export-assistance funds, but **tobacco** has been **struck from the list**.

Then, over in another part of Washington, the Administration has **refused** to let our overseas customers finance their tobacco purchases through export credit programs. Again, **all other** agricultural commodities are on the approved list and get full benefit of this government assistance program. But tobacco, **because it's tobacco**, has been **banished** from the playing field.

Both of these decisions are **blatantly unfair**. Even worse, they're **economically stupid**. At a time when exports can contribute significantly to our economic recovery, the U.S. government is placing one of its strongest export commodities under **severe** handicap. Lacking loan guarantees, our tobacco industry now has to compete in the world market with a **serious disability**. Customers who would prefer to buy our leaf – but who can't finance their purchases without loan guarantees – will now be forced to buy from our competitors. Our government has given them no other choice.

On another trade policy front, I want to say a few words about the North American Free Trade Agreement currently under consideration. In general, NAFTA could well be the model for establishing the new trading order of the world. The complications of GATT in resolving major trading issues in the six years of the Uruguay Round serves as a reflection of the need to re-order international trading arrangements. NAFTA has significant potential for setting up a trade arrangement that offers mutually beneficial trade between developed and developing nations.

In the broadest terms, its primary advantage for the U.S. is that it increases the size of our "domestic" market by 45 percent because it adds 27 million Canadians and 90 million Mexicans to the present U.S. market of 252 million consumers. This gives us a North American domestic market of nearly 370 million consumers, and gives us size advantage over the new Unified Europe with its 323 million consumers.

We certainly don't have the time today to examine all the provisions of NAFTA, but I want to review for you briefly those that apply to tobacco and look at their implications for our industry.

First, NAFTA removes the import licensing requirements that have been imposed by Mexico on U.S. manufacturers. We see this as a **positive** step to increasing trade because it gives our industry long-denied access to the Mexican market. At least, technically.

Another provision of the agreement permits Mexico to implement a 50-percent ad valorem tariff on U.S. tobacco entering Mexico. The tariff would take effect when the agreement is ratified and then be phased out over 10-year period. The industry is greatly displeased with the 50-percent tariff because the provision is incompatible with free trade philosophy and objectives. It is our view that increasing the ad valorem tariff on U.S. tobacco entering Mexico will price U.S. leaf and tobacco products well out of the Mexican market and will enable Mexico to strengthen its competitive position against U.S. industry during the decade. The Tobacco Agricultural Technical Advisory Committee has suggested a compromise of a 5-year phase out. While this is not ideal, it is preferable to the 10-year period included in the agreement.

Third, the agreement limits the foreign content of manufactured tobacco products to 9 percent of their total value (including packaging). In this context, "foreign" means "outside North America." Basing North American and foreign content on transaction value rather than on product content is a major point of contention within the industry. In addition, the industry views the 9-percent limit as only marginally adequate.

The NAFTA is not perfect, but its provisions for tobacco are, on the whole, positive. Indeed, if tobacco could have access to **all** markets under the same conditions granted by NAFTA, our industry would benefit.

It is also vital that our government continue to support the tobacco industry's efforts to overcome non-tariff trade barriers abroad. In China, for example, the phyto-sanitary regulations that bar U.S. tobacco from entry do not have proven scientific basis. These regulations prohibit the importation of tobacco grown in a region known to have blue mold infestation. But, research findings **do not support** the assumption that blue mold is transmitted by cured, re-dried leaf.

Our industry is working with the government to invalidate such policies as these – policies that don't make sense scientifically – so that they can be dealt with as the political trade issues they really are. The U.S. government can deal effectively with unfair trade practices. Witness the success of our efforts to break through non-tariff trade barriers in Japan, Taiwan, Korea and Thailand. These are now strong growth markets for the U.S. tobacco industry. Sales of U.S. cigarettes have increased 64 percent in these four markets combined over the last five years, and exports of U.S. leaf tobacco have risen 28 percent to these four countries since 1989. We know we can have similar success with unfair trade barriers – if our government will continue to work with us.

Now let's turn to the home front and look at what's happening here in the United States. As you probably know, imports of cigarette leaf tobacco are on the rise again. Flue-cured imports increased 9 percent last year, unstemmed burley imports were up 39 percent, and imports of other cigarette leaf tobacco went up 53 percent over 1990. These increases have rekindled some rightful concern about price competition among flue-cured producers.

There are a number of factors driving the increase in imports. Price-value cigarette brands – also known as “generics” – now hold a 25-percent share of the entire U.S. cigarette market, and that trend is still on the rise. According to some market observers, generic brands may occupy over 40 percent of our market in the near future. Clearly, the steady growth of price-value cigarettes in the United States – combined with the pressures of multi-tiered pricing and tight cash supplies on the wholesale end – forces manufacturers to find inexpensive sources of tobacco to make these low-margin products.

At the same time, exports of U.S.-grown flue-cured dropped by about 12 percent last year – although I think it is important to point out that some of that decline was due to delayed shipments to Japan. Burley fared much better, with exports 23 percent higher than in 1990. The USDA expects the market for tobacco exports to remain strong this year, forecasting growth of ten percent for leaf exports –although we have to remember those late shipments to Japan – and an increase of three percent for cigarette exports.

Cigarette price segmentation has long existed in other markets of the world. It's newer in our home market, but it's clearly here to stay. And its impact is significant on our tobacco growers.

The U.S. has the reputation and the product to supply the world's demand for premium leaf. This premium leaf segment will continue to remain important to us, but there are now other expanding market segments we should look at very carefully. There is probably not any potential for us in the low-price segment of the world market, although there may be some possibility here at home. But we should examine possibilities in the mid-price range. At present, our major competitors are supplying a large segment of the mid-range market. We must determine whether there is potential for us there, and, if so, how much? Some questions we must consider: Will Turkey continue to buy primarily in the U.S. market? Will Egypt return as a continuing customer?

The U.S. has shown slow but steady growth in leaf output over the last few years. Our flue-cured production has increased 35 percent since 1986, but our share of the world total has re-

mained essentially flat, at around 18 to 20 percent. At the same time, our burley production has nearly doubled while our share of the world total has actually dropped to only 22 percent.

Meanwhile, our competitors have been forging ahead.

Despite a "devastating drought," Zimbabwe produced a flue-cured crop of 190 million kilos this year. Exports are expected to total between 140 and 150 million kilos. Since 1987, Zimbabwe has increased its flue-cured production by 58 percent, expanded area planted by 35 percent, and total exports have risen 27.6 percent. Between 1988 to 1991, Zimbabwe's exports to the European Community increased 33 percent, to the Far East 107 percent, and to North & South America 423 percent.

In Brazil, flue-cured production of 330 million kilos in 1992 is well above 1991 production of 261 million. And Burley production of 80 million kilos is well above last year's 53 million. Exports are solid this year. The crop is extremely good and growers are relatively satisfied with prices.

Malawi's 1992 flue-cured crop totals 25.5 million kilos, and its burley crop 85 million kilos. Flue-cured production has increased 21 percent since 1986, while burley output has risen 181 percent in the same period.

Italy has registered a 63 percent increase in burley output in the past five years, although its burley exports have grown by only 19 percent. Stocks on hand have doubled.

On the demand side, worldwide cigarette production has grown by 5 percent in the last five years. In our traditionally strong markets, we see cigarette production on the rise in the European Community – up 10 percent since 1987 – despite declines in Italy and France. We continue to see strong production growth in Germany, the U.K., Spain and Holland. Turkey has increased its cigarette production by nearly 30 percent in the last five years. And in our largest Asian market, Japan's cigarette production has risen about 2 percent since 1987.

China holds promise, too. China is the world's largest leaf producer – 40 percent of all the tobacco grown in the world is grown in China. It's the world's largest cigarette manufacturer – 30 percent of the world's cigarettes are made in China. It's the world's largest tobacco consuming nation – 38 percent of all the tobacco consumed in the world is consumed in China. What happens in China's tobacco industry affects the world market on a grand scale. And this has a tremendous impact on us. China has developed a plan of expansion into the world market that calls for its role to be even greater. As part of this new plan, China is actively pursuing markets in Asia and Africa to increase its leaf exports. It's aim is to achieve annual exports of 200 million kilos within the next several years. This level of Chinese involvement as a seller in the world market will have an enormous impact, and we must be ready to compete effectively, armed with **strategic market advantages**, and not hampered by counter-productive government policy decisions.

You've probably heard talk about whether some changes are needed in our tobacco production and marketing system or in our price structure to help the industry deal with shifting trade trends and new economic realities. Let's talk for a few minutes about **why** these questions have come up and about some of the ideas being studied.

One of the questions now being analyzed and discussed throughout the industry is whether U.S. growers can and should try to compete with the lower-priced off-shore tobaccos in order to broaden market opportunities – both at home and abroad.

This is why the Tobacco Marketing Cost Study Committee and the Five-State Flue-Cured Committee have been looking into the implications of modifying production targets in response to changing demand.

One of the strategies they have examined involves a two-tiered pricing system. In principle, this could be implemented. In fact, technical considerations of administration should not present undue problems. In the short term, a two-tiered pricing system could enable U.S. tobacco to compete in the price-driven market of “substitute” tobacco styles. But in the long run, this is not the market with greatest potential. Should we, then, ignore the premium market, which may have the greatest long-term growth potential, in favor of targeting a lower tier market? Of course not. But, the cost study committee is looking at ways the U.S. could use a more competitive strategy in **both** markets for the long term.

Of the many aspects this group has studied, one that has emerged for serious consideration is that if we are **serious** about competing in the world market, U.S. growers should consider lobbying for **minimum** annual price support increases and a more aggressive quota strategy. This economic reality deserves our consideration, even though it's tough to swallow.

Here's a really tough taste of reality for us. Back in May, there was a leaf symposium in London, England, where top executives of leaf and cigarette companies worldwide got together to discuss what is happening in the industry and what we should expect in the future. Most of what was said during those two days was important, but there was one statement made by the president of a European leaf company that I want to share with you today because it reveals a **market reality** you and I cannot ignore. He said:

“...Cigarette quality isn't dependent on high-priced tobacco. I want to take manufacturers off the hook by suggesting that, when they are buying cheap tobacco, they are no longer interested in quality. They may be interested in a quality cigarette, but they are now learning how to achieve a quality product with much cheaper tobacco. ...”

Indeed, it is tough to consider such changes as re-structuring our market price system. For one thing, quality has been our hallmark over the years. The superior quality of U.S. tobacco has enabled us to be the price leaders in the world market for premium leaf. But, as with all things, there is a limit. We must **stop** the erosion of our market share and **rebuild** our sales worldwide. To do this, we must be price competitive. Price competitive at a point where **everyone** in the industry can realize a profit and grow their businesses, both **farm** and **factory**.

As leaf dealers, we are working in cooperation with the operating committees of grower and warehouse groups to review our options and develop strategies for competing in the world market of the future. We support and encourage the Marketing Cost Study Committee's work as well as the efforts of the Five-State Flue-Cured Committee, as they investigate alternative adjustments in the tobacco program that would make our tobacco more competitive.

For six years, the new tobacco program has worked well. It has done what it was designed to

do. But all things change, and world market conditions are no exception. If we want our tobacco program to continue to work well, we have to make sure it is flexible enough to adapt to new trading patterns in the world market.

As we discuss all of these issues, we should remember that the answers we seek may not always be specific, but may instead provide us with options for a new direction. The test of our wisdom in selecting this direction for our industry will **not** be measured by how firmly we adhere to tradition. Instead, our wisdom will be measured by **how well we achieve** in the competitive world arena.

Speaking for the Leaf Tobacco Exporters Association, I want to emphasize that what I've said and what the marketing cost committee is studying regarding the production of cheaper tobacco should **not ever** be construed as an indication that we should forsake our traditional status in the world market when it comes to quality. We must do all we can to reinforce our position as the reliable supplier of the best tobacco in the world.

Meanwhile, we should **investigate** the possibilities of participating in this other market for lower-priced tobacco. We should factually answer the question: Can we supply the demands of **both** markets without risking our reputation for superiority?

Around the globe, demand for tobacco remains strong as new markets develop. Our challenge is to meet as many of these demands as we can – whether in war-torn Yugoslavia or in the new Commonwealth of Independent States or in economically diverse areas of the United States. We must meet our customers' needs by matching supply to demand and offering the best price/-quality package in the market. And we must have fair and equal access to trade-building programs and loan guarantees that are given to every other farm commodity.

Ladies and gentlemen, we should look forward to the challenge. For as we conquer our problems one by one, we can see a strong future for our U.S. tobacco industry.

Outlook '93

For Release: Wednesday, December 2, 1992

DOMESTIC AND EXPORT CIGARETTE OUTLOOK

O. Witcher Dudley III
Retired Vice President, Leaf, Philip Morris USA

Thank you very much for having me with you today and for affording me the opportunity to give you Philip Morris's perspective on the export and domestic outlook for the cigarette industry.

Let me state at the outset that at Philip Morris, we are optimistic about our industry's future. In the last two years, U.S. manufacturers produced more cigarettes than in the early 1980's. I must add, though, that the cigarette business, at home and abroad, is undergoing far-reaching and fundamental change.

Today's cigarette industry is not the same industry it was five years ago, three years ago, last year -- or, some experts would say, last week. This change is driven by two elements: The growing preference for American-blend cigarettes among foreign smokers; and the steady shift among U.S. smokers from premium-priced "high image" brands to a growing range of economy-priced discount brands.

With these circumstances in mind, let's first look at the export market and then at the domestic market.

Cigarette export market

The world outside the U.S. consumes about five and a half trillion cigarettes annually. Over the past decade, lower trade barriers, weaker government monopolies and emerging market economies in the former Soviet block more than doubled the available export market for U.S.-made cigarettes from about 40 percent of that market to nearly 90 percent those five trillion-plus units.

The enthusiastic acceptance in foreign markets of Marlboro and other premium quality American blend cigarettes has meant dramatic export market growth. In 1986, the U.S. exported 60 billion units. By last year, volume growth in places like Japan, South Korea, Taiwan and Turkey boosted that figure to 180 billion units, an increase of 300 percent. Exports last year constituted 26 percent of U.S. cigarette output.

Tobacco exports, including cigarettes, are expected to contribute more than \$4.3 billion to America's balance of payments in 1992.

The cigarette export boom has benefited cigarette manufacturers and tobacco growers.

Since 1986, cigarette exports have brought stability and growth to the small, family-owned farms that produce the world's highest quality flue-cured and burley tobacco. The passage of new federal tobacco legislation (about which I'll say more shortly), the completion of the flue-cured and burley buyout program and an increase in raw leaf exports contributed to the quota increases that enabled us to meet growing export demand. Meeting that demand has allowed us to keep cigarette factories running at or near capacity despite a two-to-three percent annual decline in the domestic cigarette market.

The export picture for 1992 is stable, however, we do anticipate some changes in the future that could impact cigarette exports. The initial growth surge in Japan, where U.S. cigarettes now constitute 16 percent of a 330 billion units market, has stabilized, although we expect Philip Morris's market share to rise steadily from its current level of 11 percent. We also foresee a drop in Philip Morris cigarette exports to Turkey in favor of local manufacturing agreements. However, we anticipate a rise in U.S. flue-cured and burley exports in support of those manufacturing operations.

Through September, U.S. cigarette exports totaled approximately 140 billion units, about 10 billion more than was exported for the same time in 1991. Cigarette exports for 1992 should exceed the volume exported in 1991.

The economic instability in some regions of the world creates a sporadic (vs. stable) demand for our products which makes it difficult to forecast future export sales. While cigarette exports could decline in the short term, the outlook is optimistic for the long term. Despite severe public smoking restrictions enacted last month in France, the market in the European Community and in Western Europe generally remains strong.

A huge cigarette market -- as much as a trillion units -- is taking shape in Eastern Europe and in the countries of the former USSR. It's one that Philip Morris recognized early on and where Philip Morris has been operating profitably for 20 years.

Since the end of the cold war, we bought the leading cigarette company in Eastern Germany, acquired our licensee in Hungary and last spring, we purchased a majority interest in Czechoslovakia's state cigarette manufacturer. Last year, we completed an order for 22 billion units to the Russian Republic.

Even with these advances, we have a long way to go before these emerging markets achieve their potential.

Outmoded equipment has to be replaced with new technologies. Local managers and workers have to be trained. Entire infrastructures -- transportation, roads, power, water -- have to be upgraded. Suppliers and consumers have to adjust to market

economics. A constant challenge is finding ways to make operations pay when hard currencies are scarce or non-existent.

I'll end this segment of my report by saying that cigarette and leaf tobacco exports hold great promise for manufacturers, growers and the American economy generally. Our export markets represent a tremendous opportunity, but like any good investment, they require time and patience.

The U.S. Cigarette Market

Despite an annual contraction of two to three percent, the U.S. cigarette market remains one of the world's largest, and cigarettes continue to be a big, important business. Retail cigarette sales exceed \$40 billion.

It's also a changing business. People say the same thing about the domestic cigarette market as they say about the weather in some parts of the world -- if you don't like it, just wait a few minutes.

A business that was built on image-based marketing, brand loyalty and price inelasticity has undergone a far-reaching and, as far as we can tell, long-term transformation to one that is price-driven and commoditized. About 150 billion cigarettes sold in the U.S. today -- about 30 percent of the total market -- are discount brands. The industry expects that percentage to rise steadily.

The change in our business has several root causes.

First and foremost is the contraction I mentioned a moment ago. Between 1982 and 1991, volume declined about 20 percent from 634 to 510 billion units. More brands and packings are being aimed at fewer smokers.

Second is the recession. Taxes and costs have driven the price of premium-priced cigarettes beyond the means of many adult consumers.

Third is America's changing demographics. The 21 - 34 age group that is the underpinning of the premium cigarette market has shrunk as percentage of the total population.

The changes buffeting our industry are formidable. But I remind you that tobacco became one of America's biggest and most profitable agriculturally based businesses because it did not shrink from change. To the contrary, our industry not only adjusted to changes in consumer taste and manufacturing technology, but took the lead.

From the first cigarette making machine in the 19th century ... to the development of the American blend of flue-cured, burley and oriental tobaccos early this century ... to the introduction of filter tipped cigarettes of the fifties ... and the entry of low-tar

cigarettes in the sixties, our industry has been an agent of change in the consumer marketplace.

Our industry's response to today's structural changes is just as forward-looking and realistic.

Let's look first at the factory. We now have automated machinery capable of producing 12,000 cigarettes a minute. Our plants are geared to make frequent changes in production runs as we meet the demand for a growing number of brands and package sizes and types. Our people at every level are constantly trained in quality management.

At the retail counter, consumers face an unprecedented number of choices made possible by technology and marketing.

Let me give you a snapshot. In 1954, we introduced Marlboro into a universe of 37 packings. In 1981, the number of packings had risen to 214. Last year, the number of packings hit 445 ranging from unbranded cigarettes sold at the deepest discounts -- the industry calls them black-and whites -- through a series of intermediate discount price tiers to premium brands like Marlboro.

The counter display is today's marketing battleground. To see why, walk into any convenience store. You'll find coupons, discounts, bonus packs, merchandise giveaways, contests and premiums -- all designed to trigger a switch in brand preference at the point of sale.

The growth of the lower-profit discount cigarette category understandably puts pressure on manufacturing, material and marketing costs. Our greatest challenge in the Leaf Department is to contain costs and maintain quality to keep us competitive in the marketplace. The result of this challenge is a growing demand for less expensive tobaccos. The demand for lower-cost tobacco will move in proportion to that of discount cigarettes.

The quest for lower costs is causing U.S. cigarette manufacturers to increasingly evaluate flue-cured and burley tobaccos grown off-shore. Tobacco imports have grown over the past two years. After rising significantly in 1991, imports of flue-cured and burley through September of this year increased 56 percent and 24 percent, respectively.

The new demand for high quality foreign-grown tobacco, especially from places like Brazil, Argentina, Malawi and Zimbabwe tightened the world leaf supply and put prices on a level with some of the lesser quality U.S. leaf. As we approach 1993, the world supply of flue-cured and burley tobacco has increased and prices have softened.

At first glance, this is good news to manufacturers, who are fighting to salvage satisfactory profit margins as the discount cigarette category gathers momentum, and bad news to American tobacco farmers, whose crops traditionally merit higher prices.

However, the issue extends beyond cost. We at Philip Morris want to maintain a productive and mutually supportive relationship with tobacco growers, even as the volume equation in the U.S. market continues to shift in favor of discount cigarettes.

The Tobacco Program and Other Solutions

The Tobacco Improvement Act passed into law in 1986, and it was not misnamed. It plays a major role in the continued success of the U.S. tobacco program.

As developed by the farm leadership and guided through Congress by Senators and Representatives from the key tobacco states, the program encouraged U.S. tobacco farmers to produce more leaf, thereby doing a better job of satisfying worldwide demand making domestic leaf more competitive in world markets. The program benefited manufacturers by assuring a stable supply of high-quality tobacco.

Discount cigarettes have changed this picture for growers.

Like the manufacturers, U.S. growers now are faced with the tough decisions that come with a multi-tiered market. Farmers have to ask themselves if it is better to compete with lower-priced off-shore tobaccos for the discount segment, or to produce only premium quality leaf for export and for the declining domestic full-priced market.

Farmers opting for the lower-end market will have to produce more leaf to maintain an adequate income level, and this requires the greater efficiencies that come with a developing mechanization of tobacco agriculture. Not every farmer is ready for this step. Those who are will compete more effectively in the world marketplace.

These are not easy decisions. It's hard to maintain the integrity of the tobacco program at the same time as you're competing in the lower-priced leaf market. However, I know that Philip Morris will do its best to support the farmers' decisions and to help them work with legislators and agricultural officials to help adjust to these market changes.

(PAUSE)

I have tried in a short time to give you a picture of the export and domestic sides of the U.S. cigarette business. I would like to leave you with these thoughts:

- ◆ Tobacco is a global business. From raw leaf to finished product, the whole industry competes on a worldwide basis.

- ◆ The world wants American blend cigarettes, and the U.S. tobacco industry is working hard at home and abroad to fill that demand.
- ◆ Overseas markets, especially in the emerging markets of Eastern Europe, present enormous potential, but high startup costs and local economic problems, including a lack of hard currency, will cut into profits for the short term at least.
- ◆ The rapid growth of the discount category has changed the U.S. tobacco business for years to come.

I will end this report to you as I began it. To keep America's lead in tobacco production, the entire U.S. industry must continue to anticipate and respond to changes in domestic and world markets. We are no strangers to change -- or to challenge. If our past is prologue to our future, we will make the best of both.

Outlook 1993

For Release: Wednesday, December 2, 1992

THE OUTLOOK FOR OILSEEDS

Roger L. Hoskin and Nancy Morgan
Agricultural Economists, ERS, USDA

Today, I will discuss the outlook for U.S. oilseeds. My primary emphasis will be on the domestic soybean situation and outlook. However, discussion of the U.S. outlook would be incomplete without a look at the global oilseed situation and outlook. I would like to spend a few minutes discussing some of the structural changes in the U.S. soybean sector and tie that to the domestic export outlook. Finally, I will highlight some of the factors that shape the 1992/93 outlook, and look ahead to some of the longer run trends that could affect demand later in the decade.

Big Crop -- Strong Demand

Despite late planting and a cool summer, U.S. farmers produced a 2,167 million bushel soybean crop in 1992. This is the first crop over 2 billion bushels since 1985 and only the fourth on record over 2 billion. There were fears that frost, even by normally expected dates could damage yields, particularly in Minnesota, a major producer in a northern climate. But this did not happen.

A record national average yield of 37.3 bushels an acre pushed production over 2 billion bushels. Interestingly, this crop was produced on 58.1 million harvested acres. The last 2-billion-plus bushel crop (2.10 billion bushels in 1985) was made on 61.6 million harvested acres and the record 2.26 billion bushel crop of 1979 was harvested from 70.3 million acres.

From 1979 to 1992, the United States acreage planted to soybeans declined at an almost uniform rate by 12.2 million acres. But the decline was not uniform in its impact. In 1980, harvested soybean acreage in the Corn Belt region (Illinois, Iowa, Indiana, Minnesota, Missouri, Nebraska, and Ohio) was 37.8 million acres. Soybean harvested acreage in the Delta states (Arkansas, Mississippi and Louisiana) was 11.6 million acres and in the Southeast (Georgia, Alabama, North Carolina and South Carolina) was 7.6 million acres. By 1990, Corn Belt harvested acreage was nearly the same at 35.8 million acres while acreage in the two southern regions had declined to 7.0 million acres in the Delta and 3.2 million in the Southeast. Some of this acreage has gone to cotton, but not all or even most. Much of this acreage is in Conservation Reserve or is in grassland or forest.

It's not hard to see why this occurred. The analysis in this figure is based on data in the 1990 **Costs of Production** publication of ERS, published in July 1992. While we use cash costs in making short-run acreage allocation decisions; over the longer run, it is full economic returns that affect resource allocations. Hence the net returns depicted here are based on full economic costs as defined in that publication. From 1975 until about 1980, the three major soybean producing regions showed positive returns to full economic costs. Then because of rising costs and systematically lower prices throughout the 1980's, southern producers show losses. Southeastern producers have shown losses every year since 1980 except the 1988 drought which primarily affected the mid-west. Delta region producers have shown losses in 8 out of 11 years in the 1980's. Meanwhile, in the Corn Belt, soybeans have remained profitable in 7 out of 11 years. This analysis cannot be extrapolated to the conditions of any single farmer in any region. For example, producers with strong marketing programs can beat the harvesttime prices used in this analysis. But in comparing apples to apples, it is clear that southern producers are at a disadvantage to mid-western farmers. While costs have risen for both groups, mid-western producers have been able to offset the cost increases at least somewhat with increased yields.

What this means for our situation and outlook is that the high yields we've had the last 2 years are based on: 1.) the loss of lower yielding acreage thus raising the national average, and 2.) improved yields in the mid-western states. In other words, improved productivity has lead to a larger crop on fewer acres at lower costs per bushel. Furthermore, simple trend yield estimates based on historical data will, at minimum underestimate national average yields because of the acreage shift. In 1991, I estimated this effect to be about 0.4 bushels per acre. I will return to this idea later when I discuss the U.S. export outlook.

Can We Find a Home for This Crop -- Yes, But Prices Won't be High

World oilseed production is forecast at 224.2 million metric tons in 1992/93, a slight increase from a year ago. Output of oilseeds other than soybeans is expected to decline by about 4 percent this season from last. It is the 6 percent increase in global soybean production that accounts for the overall rise. Outside the United States and perhaps India, oilseed availabilities will be less than last year. Declines in world rapeseed production are due to drought in Europe and early frost in Canada. The dry weather also contributed to a decline in sunflowerseed yields in the EC, but increased plantings pushed production above year earlier levels. Globally, sunflowerseed production is up 5 percent over last year due primarily to increased outturn in the former Soviet Union. Cottonseed production is forecast to drop to 32.9 million metric tons as insect damage and drought in China precipitously reduced yields while delayed planting in the former Soviet Union adversely affected outturn. Total exports of oilseeds are expected to increase slightly to 37.0 million metric tons. However, soybean exports are expected to rise in 1992/93 by 6 percent this year over last.

The sharp reduction in high oil content seeds, particularly from Europe, and strengthening crushing margins for soybeans are spurring soybean import demand

partly at the expense of soybean meal. Current USDA export forecasts place U.S. exports at 740 million bushels for 1992/93, a rise from last year's 685 million bushels. Based on the November 12 **Export Sales Report** data, exports are running at a seasonally adjusted rate well above 740 million bushels, but the South American harvest next April will likely be larger, reducing U.S. export movement in the spring and summer quarters. This slower export movement is expected to continue into 1993/94 as a result of slightly lower forecast U.S. production and increased supplies in South America.

Season average prices for the last three years have been in the \$5.60 to \$5.80 range. In 1992/93, the season average prices could be lower. The current forecast price range is \$5.20 to \$5.60 a bushel. Like some other industries in the domestic economy, the soybean sector has undergone a restructuring which has effectively lowered U.S. costs per bushel. Many farmers can still show a profit at the prices received in recent years. The lowered cost per bushel makes domestic producers more competitive in world markets than they were a few years ago, other things being equal.

Domestic crush is forecast at 1,265 million bushels, the fourth consecutive year-over-year rise. Stronger crush margins abroad have raised expectations of higher U.S. soybean exports are coupled with another record domestic soybean meal and oil disappearance to support the forecast.

The 1993/94 soybean outlook looks similar to the situation beginning to develop for this year. Although acreage is expected to be similar to 1992/93, a smaller crop will likely be harvested -- closer to 2 billion bushels -- because yields will likely decline. Overall, supply may be down as well. Total disposition is expected to be about unchanged from last year, causing a slight decline in stocks. Prices will likely remain below \$5.75 for the fifth consecutive year. It is the demand for soybean oil and meal to which I would like next to turn my attention.

Domestic soybean meal demand

The domestic livestock sector is expected to consume a record 21.7 million metric tons of soybean meal--the fourth consecutive year of record soybean meal use. The hog and broiler sectors are the largest users of soybean meal, consuming about 75 percent of the total.

Hog prices have leveled in 1992 from 1991 but are still above the liquidation point for most producers. Current forecasts call for pork production to increase moderately next year. Stable exports and reduced imports, expected in 1993, will boost domestic pork consumption in light of record hog production. For broiler producers, the sharp increases in production experienced in recent years should moderate. In 1993, returns should be above breakeven for most producers although lower than in 1992.

The feed-livestock profitability ratio has shown recovery in the second half of 1992 after declining in 1991. The indicator is a ratio of prices received by farmers for livestock products divided by prices paid for feeds. The difference between 1993 and 1991 and 1992 is that it is moderate feed prices

that are contributing to the recovery in the feed-livestock profitability ratio even though prices for livestock products have declined and are not expected to rise in 1993. Reduced availability of competing protein feeds, particularly cottonseed, also improves the outlook for soybean meal use.

Global production of oilseed meals mirrors the oilseed situation. Overall, oilseed meal production will rise slightly with the rise in soybean and sunflowerseed meals exceeding declines in rapeseed, and cottonseed meals. World imports of soybean meal are expected to decline slightly in 1992/93 to 26.2 million metric tons. A 4 percent rise in European Community imports to 13.55 million metric tons is complimented by increased export movement to Mexico and the fast-growing economies of East Asia.

This growth in Asian exports will not be quite enough to offset declines in the former Soviet Union and Eastern Europe where livestock herd liquidation continues. The outlook for domestic producers is for lower soybean meal export movement. A 770,000 metric ton decline is forecast for exports this season to 5.44 million metric tons. This decline should continue into 1993/94 as economic transition in the former Soviet Union and Eastern Europe constrain protein meal consumption.

Soybean meal prices are forecast between \$165 and \$190 a metric ton (48 percent basis), below last season's average price; implying that despite increased use, supplies are ample.

Domestic Soybean Oil Use

Domestic edible fats and oil use is forecast to rise 2.1 percent in 1992/93 following a strong 4.7 percent rise last season. Vegetable oil use tends to be supported by income and population growth. Vegetable oil itself is not considered an income sensitive item, however it is an ingredient in restaurant meals, snack foods and convenience foods--all items that respond to the business cycle. In 1991, the last year that complete data are available, per capita disappearance of salad and cooking oil climbed 1.1 pounds. Salad and cooking oils are widely used in the manufacture of snack and convenience foods. The rise contrasted with virtually no increase in per capita rises in baking and frying fat and margarine consumption. A forecast resumption in economic growth in 1993 and modest population growth underpin the forecast rise in total edible fats and oil use.

What is likely to change in 1992/93 is the composition of the vegetable oils consumed. Lower availability of cottonseed oil, slowed imports of canola oil (because of lower Canadian production) and a forecast slowdown in corn oil available for domestic use provide a basis for the forecast increase in soybean oil disappearance to 12.6 billion pounds in 1992/93, a 2.9 percent rise.

U.S soybean oil exports are forecast at 1.78 billion pounds this season compared to 1.65 last season. Adverse weather in both Canada and the EC have contributed to lowering world rapeseed production by over 9 percent. Less cottonseed oil will be available in 1992/93. In greater abundance will be

sunflowerseed oil and palm oil. The temporary restoration of PL480 food aid to Pakistan may bolster soybean oil exports this year while maintaining 1993/94 soybean oil exports at relatively high levels. Export Enhancement Program allocations for vegetable oil of 870,000 metric tons have been announced for 1992/93 with 11 countries targeted. The former Soviet Union and Morocco receive the largest single shares, 150,000 metric tons each, and Lebanon and Senegal are new to the list.

Of interest is the continual draw-down in the world vegetable oil stocks-use ratio over recent years and the implications for higher oil prices. Over the past few years, prices have been held in check by high U.S. soybean oil stocks and the relatively abundant supplies of other oils, particularly palm and rapeseed oil.

The lower extraction rate for U.S. soybean oil in 1992/93, combined with a significant draw-down in U.S. soybean oil stocks, lower foreign supplies of vegetable oils, and slow palm oil exports out of Malaysia, will likely strengthen oil prices in 1992/93 and induce more price volatility in the near term. Consequently, the season average price for soybean oil in 1992/93 is forecast higher than last year's 19.1 cents-a-pound average.

Additional Factors Affecting the Extended Outlook for Oilseeds

This year is unusual in that there are a number of policy issues that could affect the outlook for the oilseed sector. As of today many of these issues remain to be resolved. Some will be highlighted here.

The Common Agricultural Policy reform in the Community is already underway. EC subsidies for oilseed production resulted in rapidly rising production of rapeseed and soybeans in the 1980's in the EC countries. The new reform policies will rely on support payments rather than price incentives to maintain farm incomes while set-asides will reduce production incentives. Farmers will receive compensation for set asides and will receive direct payments for planting oilseeds. Because the new programs have just taken effect, it is particularly difficult to assess the effects on the EC oilseed sector. But it is expected that EC oilseed production will decline from the 1991/92 record level. Compared with the past program, the reform is expected to reduce the incentive to increase yields because payments will be made on the basis of area planted instead of production. Yield enhancements will be based on market incentives rather program incentives. Presumably, with set asides in place, reform could reduce EC oilseed production by as much as 10 to 20 percent by mid-decade.

Secondary effects are even harder to determine, but lower support prices for grain would likely increase grain feeding, reducing use of protein meals. However, lower prices for agricultural products and lower feed prices could increase demand for livestock products in the EC.

The North American Free Trade Agreement (NAFTA)

Mexican consumption of soybean products has outpaced domestic production over

the last decade. The United States is Mexico's primary supplier of soybeans and products accounting for about three-fourths of the total of each. USDA export programs have been important in maintaining U.S. market share.

Trade liberalization between the United States and Mexico could result in some further gains. If processor subsidies in Mexico are reduced, lower costs for imported soybeans and products and lower prices to consumers would stimulate import demand. Reduction in producer price supports would lead to lower producers incentives to produce soybeans on irrigated land. Since the United States has traditionally been the major vendor of soybeans and products to Mexico, liberalization would likely result in export gains.

The Former Centrally Planned Economies

The countries of Eastern Europe and the former Soviet Union probably are a major uncertainty facing the oilseed market over the next 3 to 5 years. Reforms are underway and their outcome is still uncertain. However, these countries have historically had per capita meat consumption level rivaling those of the United States and Western Europe. Because of this, these countries have been substantial net importers of protein feedstuffs. One of the initial consequences of internal reform has been the reduction in food subsidies reducing the per capita consumption of meat, and liquidation of livestock herds reducing the importation of oilseeds and oilseeds meals.

In the short run, the former Soviet Union will continue to rely on western credits for feed purchases. Russia is a major recipient of the \$121 million announced credit for oilseed meal, but this will probably translate into about one-fifth the quantities that were purchased last year. For the near term outlook, export prospects to this part of the world will depend on announced credit arrangements. While GSM amounts have been announced, amounts and specific commodities can be reannounced at later dates.

Over the longer term, the populace of former Centrally Planned Economies are accustomed to meat consumption and a resumption of real economic growth could lead to rapid rises in consumption, although probably not exceeding the high levels of the mid-1980's. However, resumption of real economic growth in Eastern Europe and the former Soviet Union is not considered likely until the mid-90's under the best of circumstances.

Summary

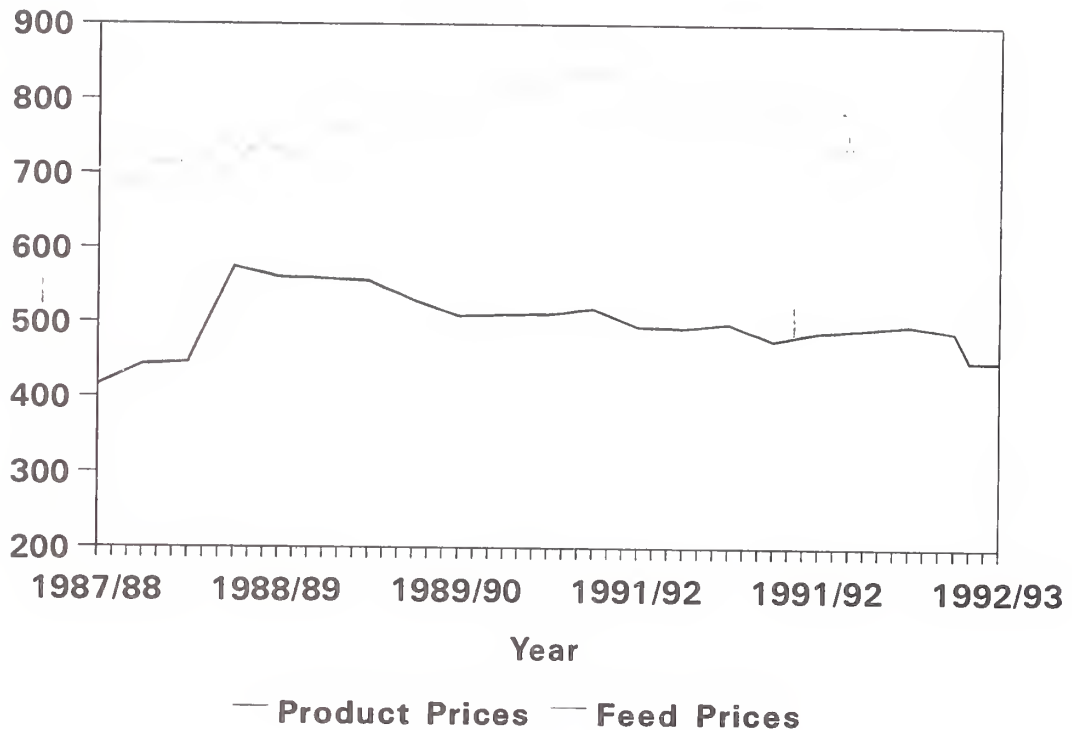
The U.S. industry has undergone a restructuring over the decade of the 1980's, resulting in a downsized industry benefiting from increased yields and higher productivity. As we continue into the 1990's, it is likely that the shakeout in the industry is ended, barring unforeseen circumstances.

The outlook for the U.S. soybean industry is positive. For 1992/93, although crop production exceeded 2 billion bushels, domestic use and exports will keep ending stocks near 340 million bushels. Prices could be lower than last year, but are still unlikely to trigger much if any marketing loan activity.

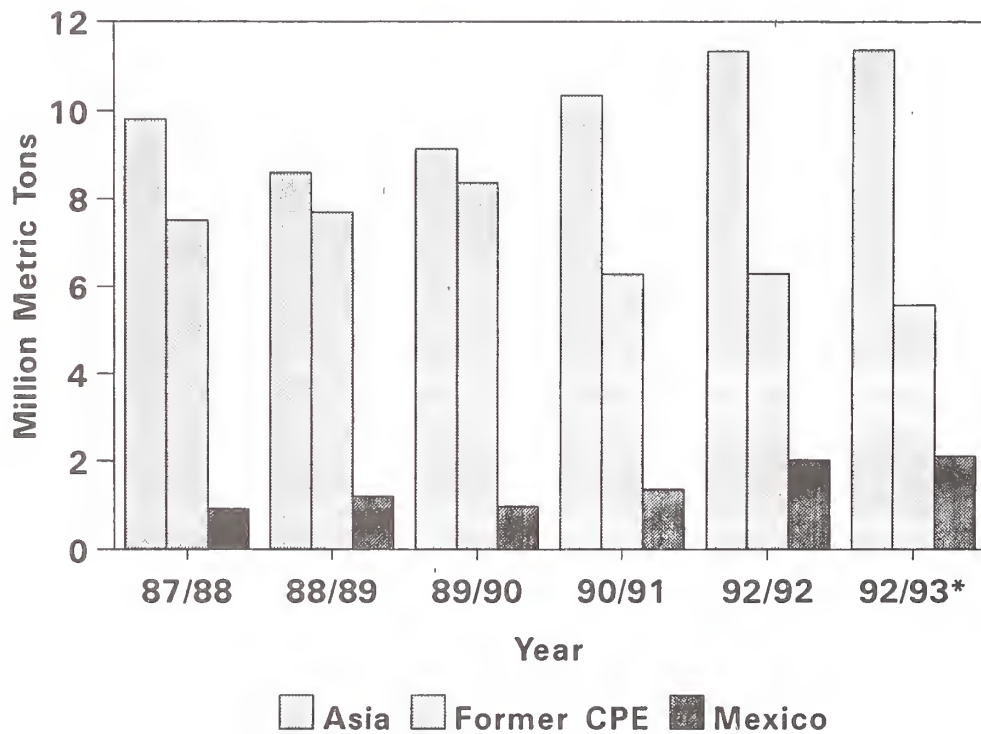
Globally, supplies are tighter than last season. Demand for soybeans and soybean meal in Asia and Mexico are positive factors for U.S. exports. This contrasts to the poorer prospects in Eastern Europe and the former Soviet Union.

In the long run, domestic producers will probably gain from changes in the world policy environment. CAP reform and NAFTA provide leading examples. Lower oilseed production in the EC, greater trade prospects in Mexico, and a potential slowdown in soybean production growth in South America are all opportunities for the U.S. industry.

LIVESTOCK & FEED INDEXES (1910-1914 = 100)

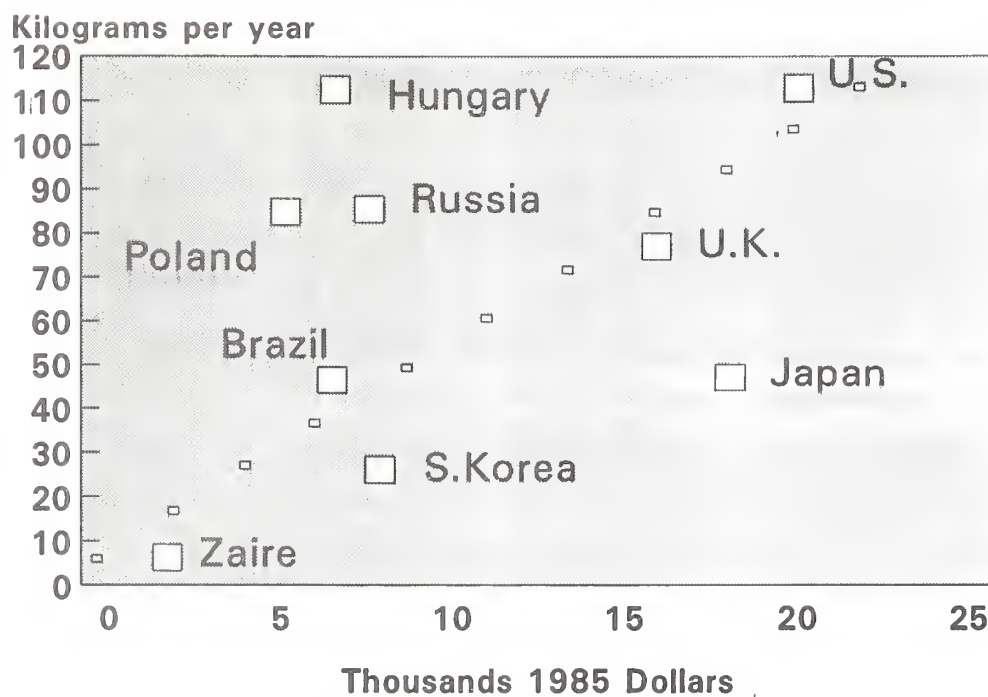


SOY MEAL & MEAL EQUIV IMPORTS



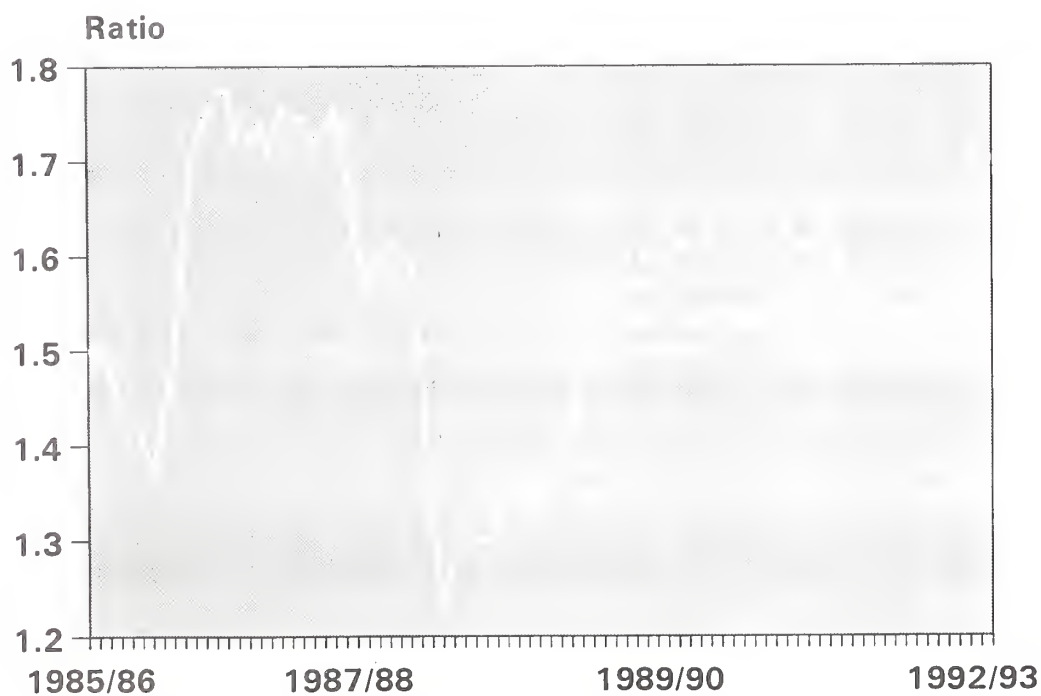
*Forecast.

Relationship Between Per Capita GDP And Meat Consumption, 1990

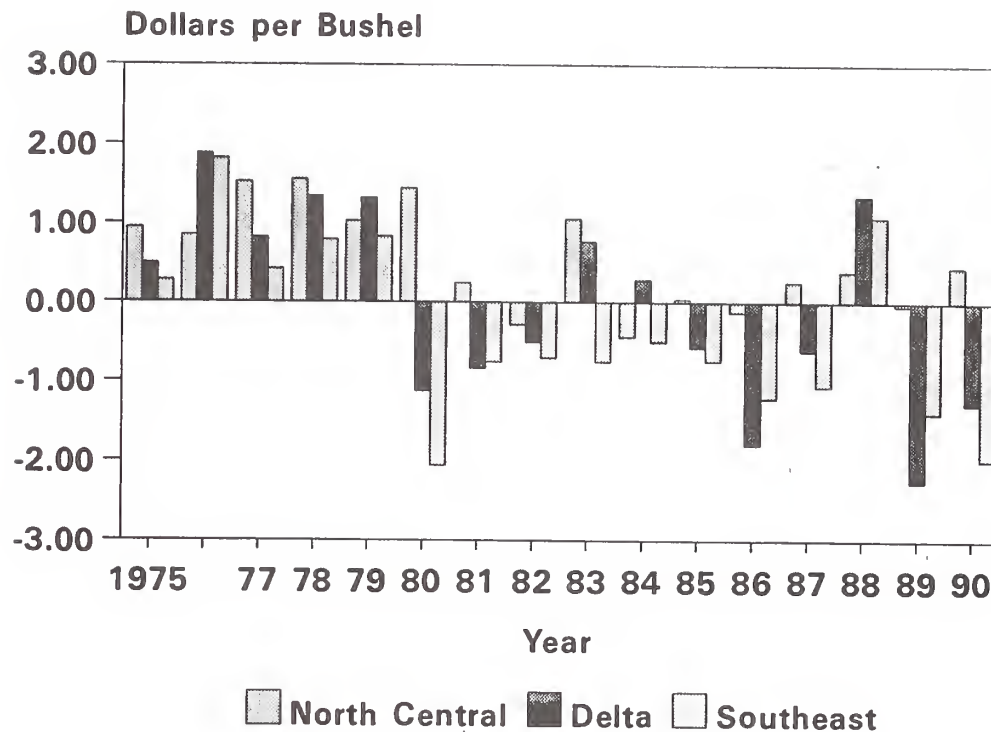


Sources: AGROSTAT Database; Illarionov
[1992], pp. 130-33

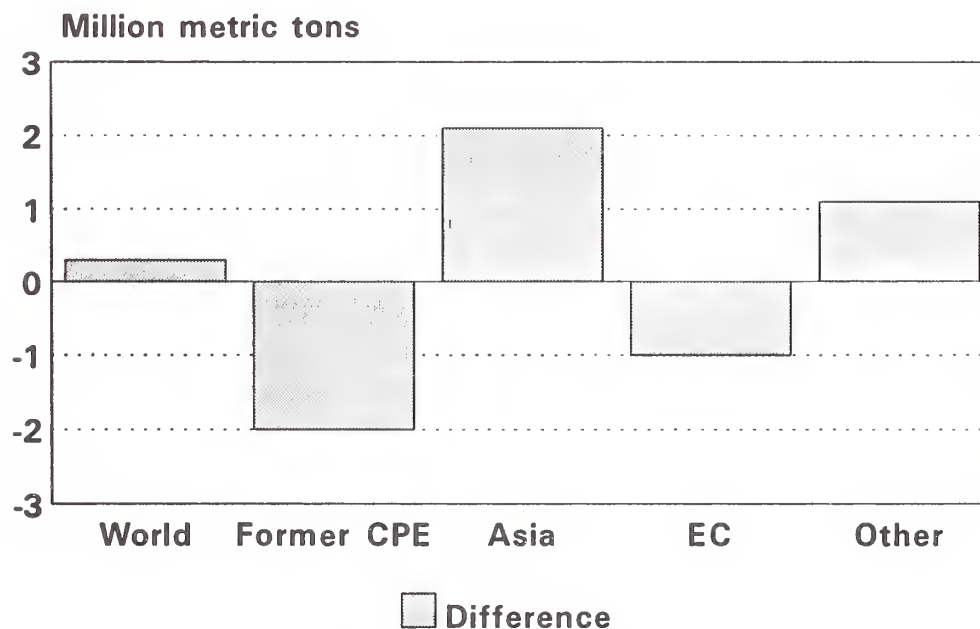
LIVESTOCK AND TO FEED PROFITABILITY RATIO



REGIONAL RETURNS TO SOYBEAN PRODUCERS

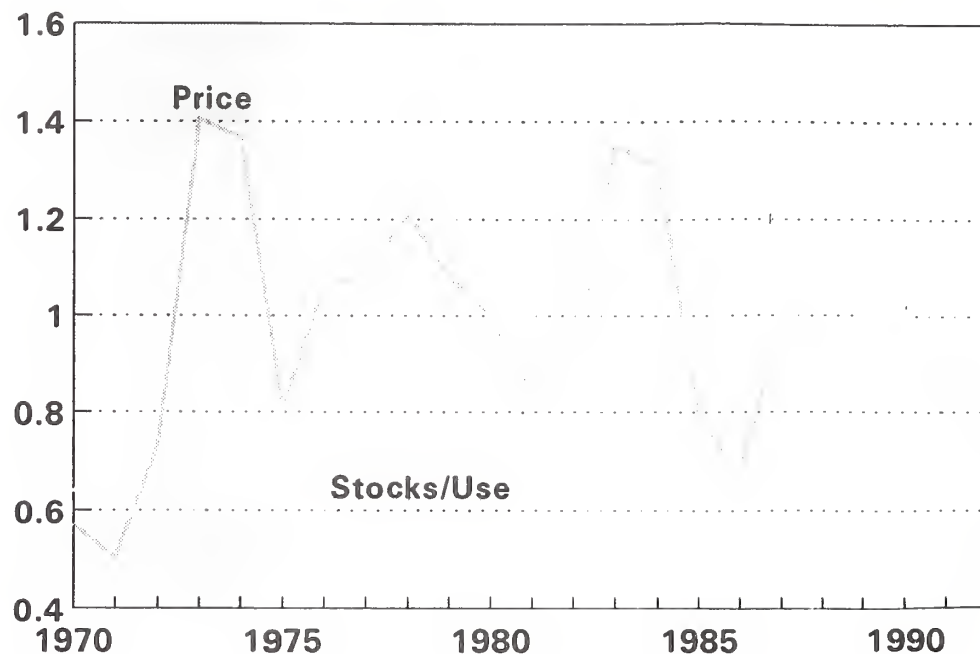


ASIA DOMINATES GROWTH IN SOYBEAN PRODUCT TRADE BETWEEN 1986 AND 1992



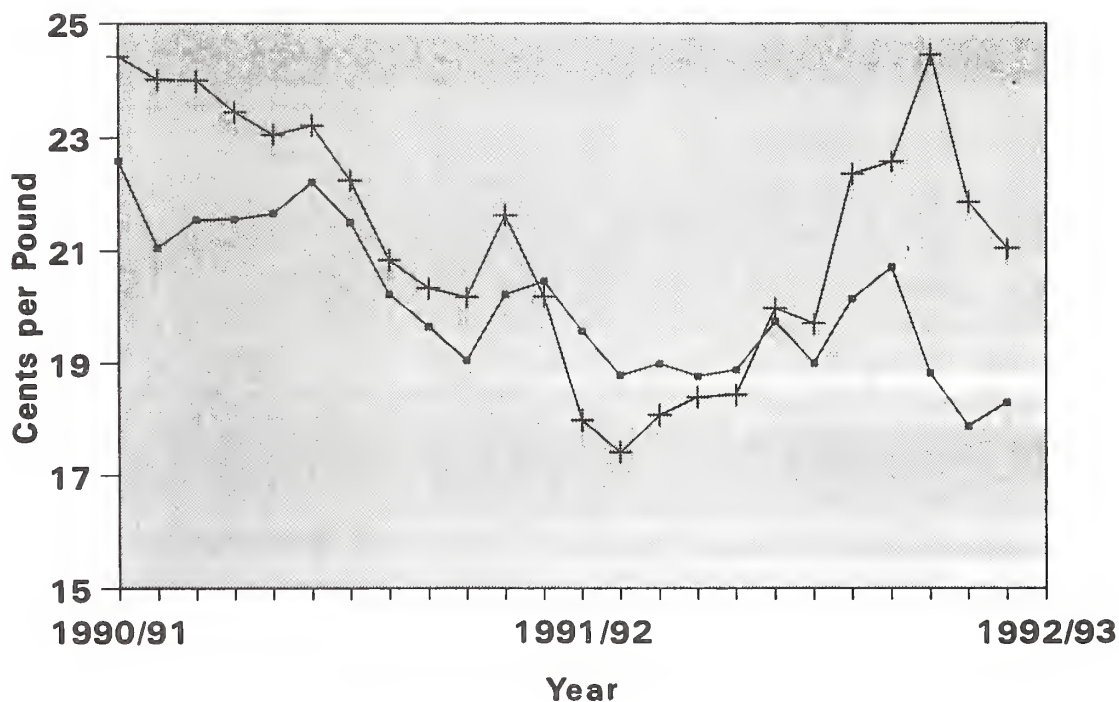
(Includes Beans in Soybean Meal Equivalent).

Global Vegetable Oils: Stocks/Use Ratio and Prices Indexed



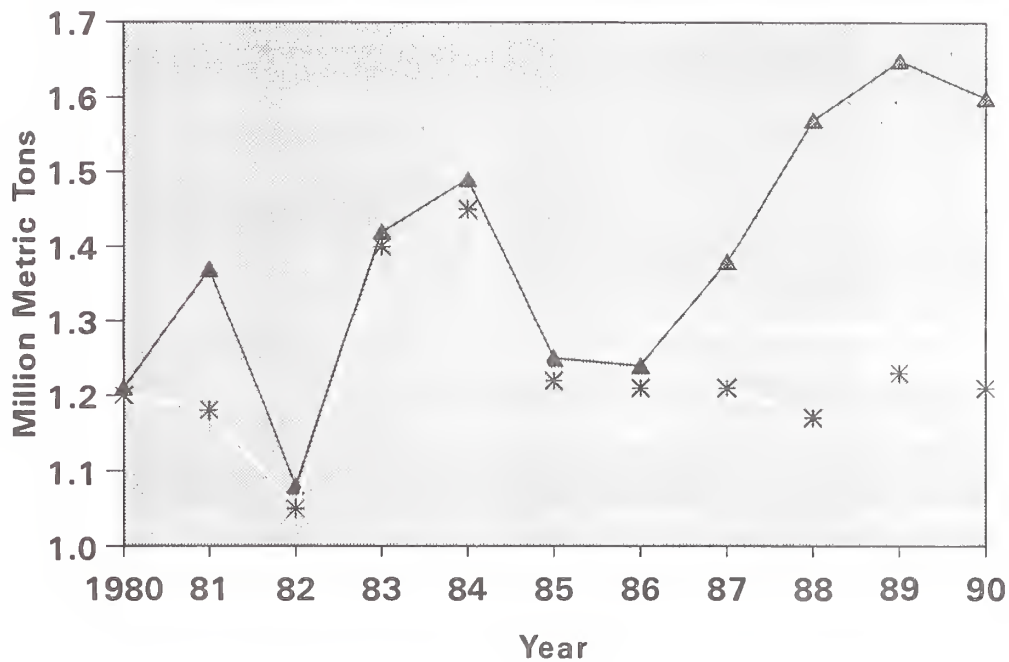
Index: 1980 = 1.0

SOYBEAN OIL DISCOUNT WIDENS



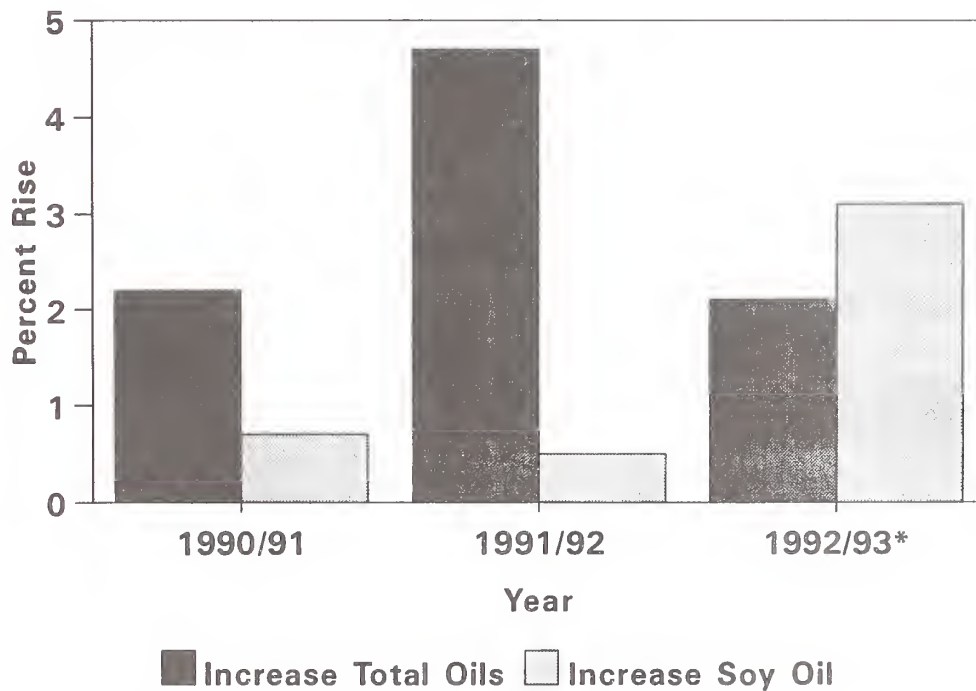
—■— Soybean Oil Price —+— Cottonseed Oil Price

MEXICAN SOYBEAN MEAL CONSUMPTION Versus Production



* Production ▲ Consumption

RISE IN TOTAL U.S. OILS USE COMPARED TO SOY



*Forecast.

For Release: Wednesday, December 2, 1992

SYNTHETIC AMINO ACIDS: A FORCE TO BE RECKONED WITH

Thomas Earley
Vice President, Abel, Daft & Earley

The oilseed case, GATT, and changes in the European Community's farm support programs have been capturing most of the attention recently, but there are a number of other things happening that affect the oilseed sector. One of the most important is the growing use of synthetic amino acids.

Since Archer Daniels Midland Company announced three years ago that it was going to jump into the lysine business with both feet, at a time when every other producer was expanding as well, there has been plenty of reason to wonder what an onslaught of synthetic amino acids will mean for soybeans. In view of this concern, the United Soybean Board sponsored a preliminary study of the issue which we completed earlier this year. We concluded that while it's bad news in the short term, there may be some improved opportunities for soybean growers in the future. Lysine/corn mixtures are clearly displacing some of the soybean meal in hog and poultry rations today, but down the road there is at least a chance that there will be more complementarity than competition between soybeans and synthetic amino acids.

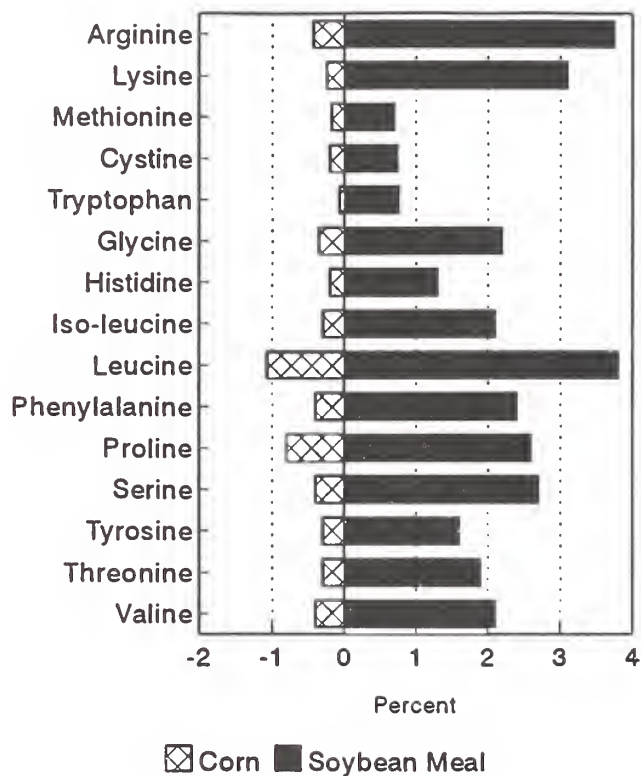
While professional nutritionists have long understood the complexity of protein composition, it has only been in the last twenty years that livestock and poultry feeding industries have begun to fully grapple with that complexity. As amino acid production costs have declined, and as the pace of adjustment in feeding practices has picked up, the effects on demand for soybean meal and corn have begun to be more pronounced.

Protein is actually made up of building blocks called amino acids. There are about 20 amino acids of the type that make up vegetable and animal protein, and the mix among those twenty is different for each type of protein. Plants can produce all of these amino acids, but animals can only synthesize about ten of them. The others have to be provided through the diet, and soybean meal has been a leading source of them.

The main sources of animal feeds around the world tend to be deficient in methionine and lysine, so much so that the availability of these two amino acids becomes a limiting factor in growth. For that reason, these are the two for which it has made the most sense to invest in development of cost effective production technology and manufacturing facilities.

Chart 1

Amino Acid Content Of Corn and Soybean Meal (48%)



Abel, Daft & Earley

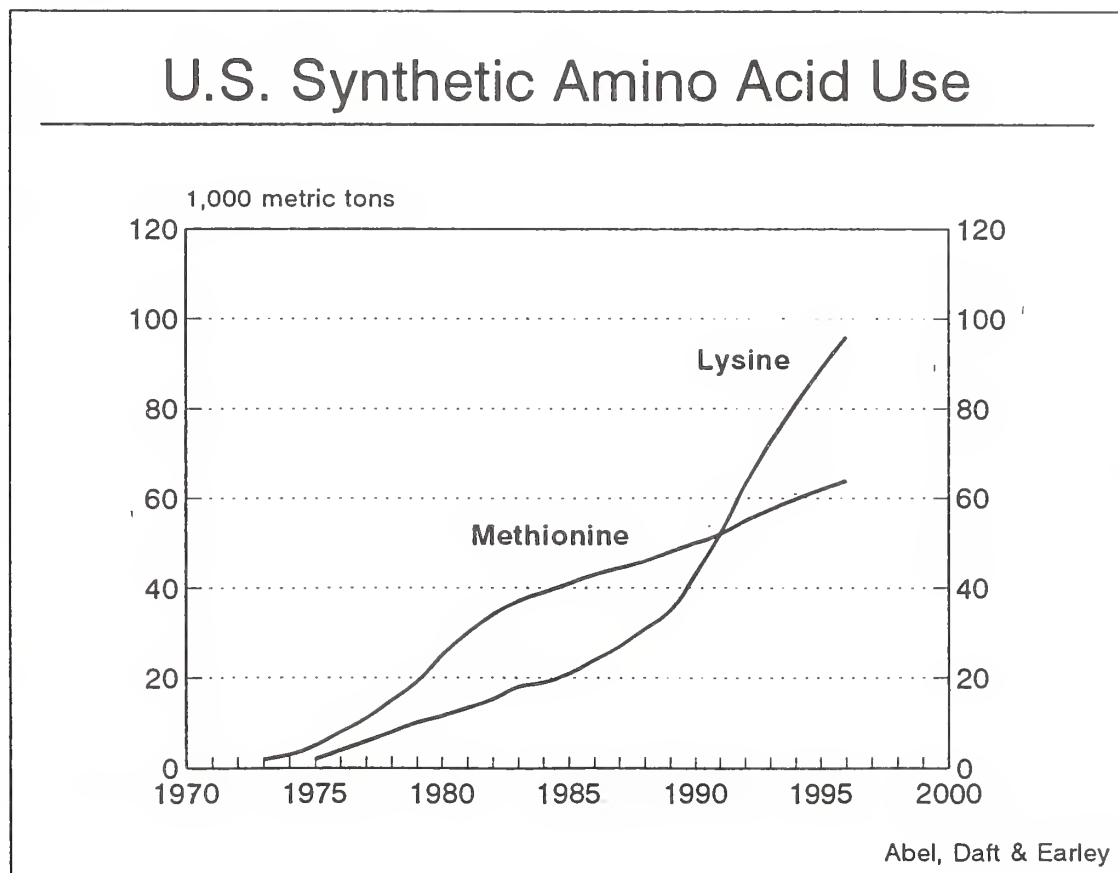
The key concept to remember is "order of limitation." If an animal needs a certain mix of amino acids to achieve a desired growth rate and carcass quality, any that are missing from feeds act as a constraint, and the excess supplies of the other amino acids cannot be

metabolized as protein and simply end up as an expensive source of energy. For poultry, methionine is the "first limiting" amino acid, and lysine is second. For pigs the order of limitation is lysine, tryptophan, threonine, and valine in the United States. In Europe threonine is second limiting.

Poultry and swine are thus far the major markets for synthetic amino acids because ruminants have more ability to synthesize amino acids, and the synthetic ones suffer too much degradation in the rumen before passing on to the part of the digestive system where they would be of some benefit. However work is currently underway on encapsulation and other protective techniques that may eventually open up the beef and dairy cattle markets to these products. Applications in aquaculture are increasing as well.

Methionine is almost exclusively used for poultry. Whether in the United States or the world as a whole, 95 percent of consumption is in feeds for broilers, layers, and turkeys. The benefits are well understood and market penetration of modern production facilities is virtually complete.

Chart 2



Use of lysine is both more varied and more recent. In Europe, pig feeding is the major outlet because lysine is first limiting in swine and the peculiarities of European community agricultural policy have driven EC feed compounders to think creatively about alternative formulations. In the United States, poultry feed has been the dominant market because of positive prior experience with methionine, the greater relative importance of poultry meat in American diets, and the vertically integrated and technologically progressive nature of the industry.

Currently it is estimated that about 60 percent of U.S. lysine use is in poultry and 40 percent in pigs. However, swine feeding is rapidly changing in the United States as farmer feeders give away to larger more modern confinement feeding operations, producing leaner breeds that have higher lysine requirements. As this occurs, the market for lysine where it is the first limiting amino acid is developing rapidly. Industry analysts expect swine feeding to account for 50 percent of lysine use within two or three years.

U.S. Lysine Suppliers

Because pure lysine is very hygroscopic, manufacturers produce a lysine salt by reacting it with hydrochloric acid. The commercially available product is L-lysine monohydrochloride, and its lysine content is 79 percent. It is crystalline, free-flowing, and almost odorless

The four major suppliers of synthetic lysine in the United States are Archer Daniels Midland (ADM), BioKyowa, Heartland Lysine, and Miwon USA. In the early 1980's most lysine was imported, but as market prospects began to look more promising, existing and new suppliers found it more advantageous to locate production facilities in or near the United States.

ADM is the brash newcomer in the world lysine business. In April 1989 the company announced that it would invest \$150 million in a biochemical division that would produce amino acids, enzymes, and specialty chemicals. The capacity for lysine was pegged at 45,000 mt, or about 45 percent of world demand at that time.

The ADM facility, located in Decatur, IL, experienced a variety of start-up problems and did not come fully on stream until the last half of 1991. But once they had reached their production objectives, ADM announced in October 1991 that lysine capacity would be increased to 113,000 mt by the summer of 1992, and that the ADM Bio Products Division would begin producing threonine and tryptophan in 1992 as well.

In May 1984, BioKyowa was the first to begin U.S. production at a facility in Cape Girardeau, MO. Capacity was initially 7,500 mt, was increased to 13,000 in 1990, and may

have increased further to 15,000 mt in 1992. BioKyowa's Japanese parent, Kyowa Hakko Kogyo Co., also owns Fermentaciones Mexicanas which supplies lysine to Mexico, Latin America and the United States. Production capacity at that facility is expanding to 15,000 mt this year from 6,000 mt three years earlier.

Heartland Lysine commenced U.S. production in Eddyville, Iowa in October 1986. The company is a joint venture between Ajinomoto, a Japanese firm, and Orsan, a French firm. The two parent companies also operate a firm named Eurolysine as a joint venture in France. Eurolysine has been the world's largest lysine production facility but seems destined to surrender that title to ADM this year. Ajinomoto also produces amino acids in Japan for marketing in Asia. Heartland's initial capacity of 7,500 mt was increased to about 12,000 mt in 1989 and 20,000 mt in 1990.

Miwon USA imports lysine from its parent company in South Korea, which has plants in Kunsan City, Collabuk-do Province, and Busan City.

Supply/Demand

Estimates of the U.S. supply/demand situation for lysine indicate that in 1991, domestic disappearance was approximately 52 thousand metric tons (tmt), up sharply from 43 tmt in 1990. Growth in offtake has accelerated somewhat due to lower prices and intensified marketing efforts by manufacturers and importers. Demand is forecast to increase a further 21 percent in 1992 to 63 tmt and reach 96 tmt by 1996. Historically, demand growth since the early 1970's has averaged about 15 percent annually.

A dramatic shift in sourcing has been underway since the mid-1982's when companies began to develop U.S. production facilities. Domestic output doubled in 1990 to 26 tmt, increased 80 percent in 1991, and is expected to double again in 1992 as the ADM expansion gathers steam. Production this year is estimated at 95 tmt.

The result has been a sharp decline in imports and even sharper increase in exports. Imports from Japan, Mexico, and France have fallen off, while Miwon's imports from South Korea have remained stable. Exports thus far have been mainly to Europe, Canada, and Mexico but will probably become more diverse as ADM builds up its marketing networks in Asia and Latin America.

Methionine long ago achieved full penetration in the U.S. poultry sector and is now a routine part of the feed formula, so displacement of soybean meal or other protein sources is not really an issue. It has already occurred.

Chart 3

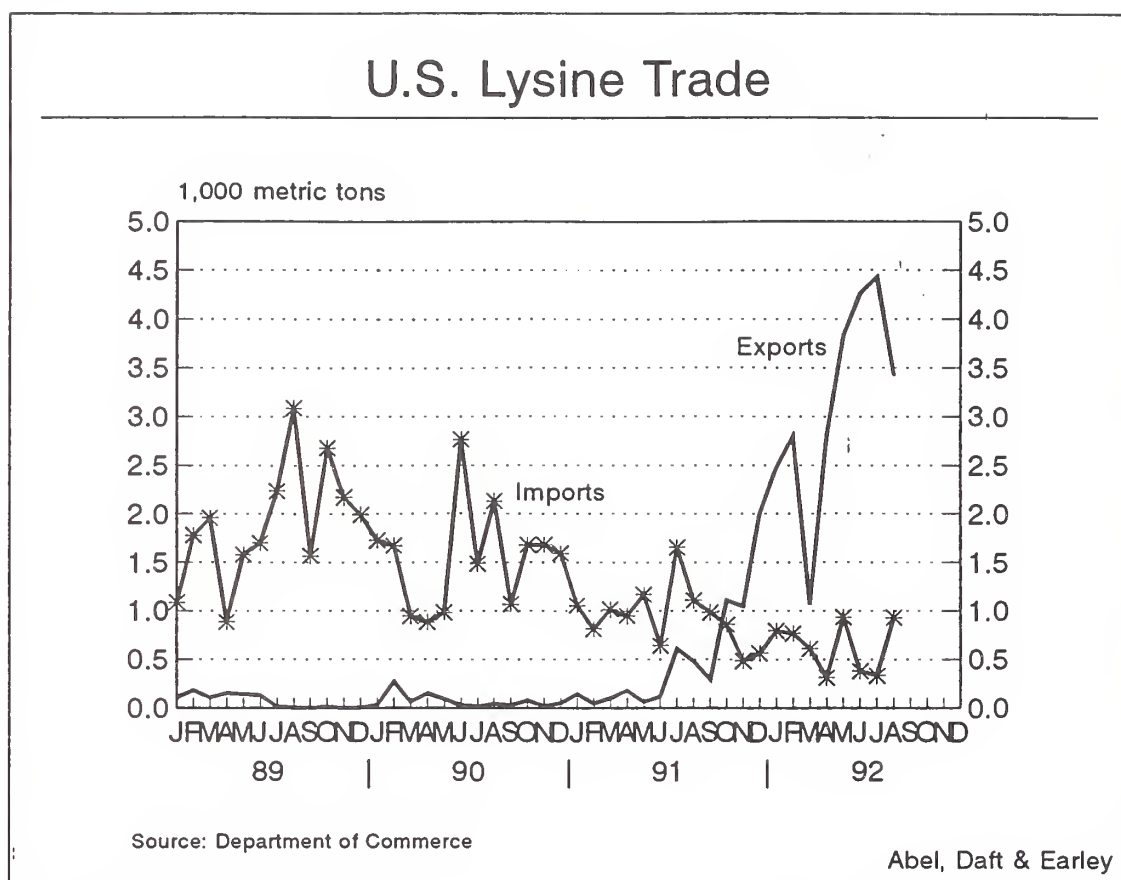


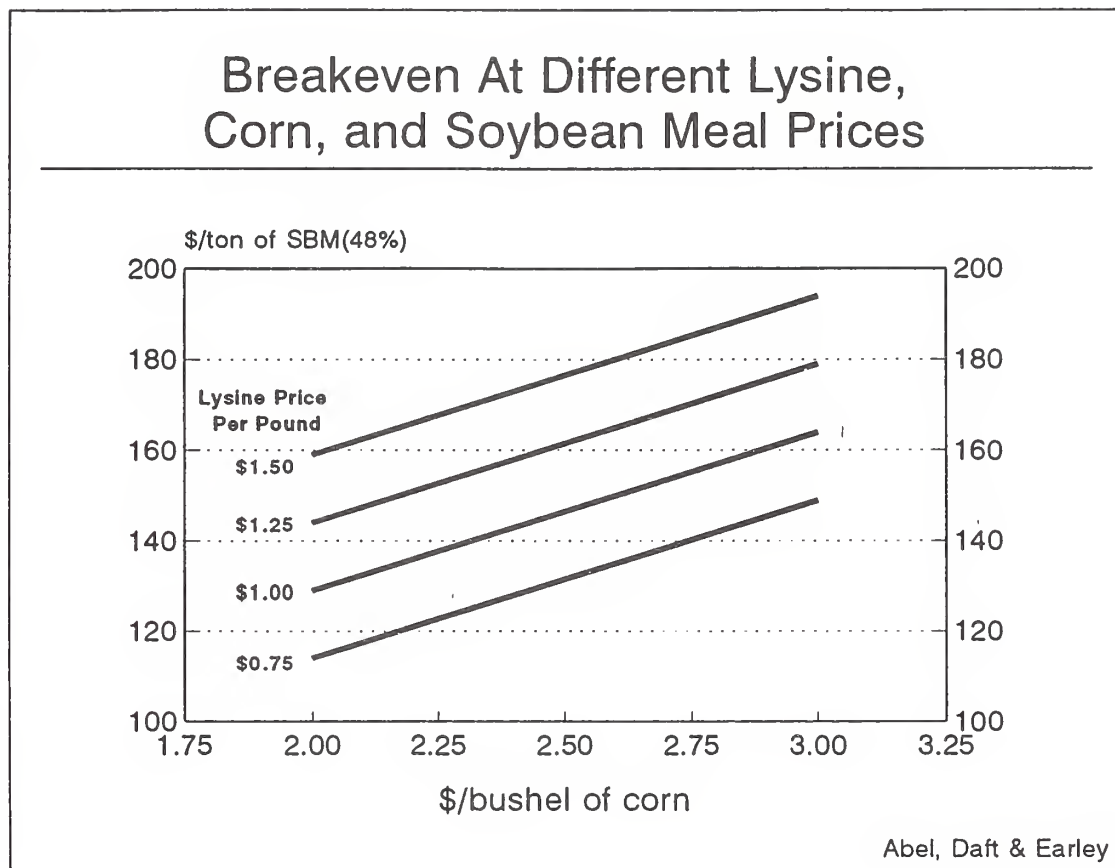
Table 1

	U.S. Lysine Supply/Demand			Projected
	1989	1990	1991	1992
	-----1,000 metric tons-----			
Production	13	26	47	95
Imports	23	18	11	8
Total	36	44	58	103
Dom. Disappearance	35	43	52	63
Exports	1	1	6	40
Total	36	44	58	103

Source: Abel, Daft & Earley

Lysine, however, is a newly invigorated competitor in feed economies that rely primarily on corn and soybean meal. One of the main advantages of soybean meal has been its comparatively high lysine content, higher than that of any of the other major protein meals, and 11 or 12 times as high as corn. Declining production costs and increased competition are resulting in lysine prices that virtually guarantee that lysine/corn mixtures will be substituted for some of the soybean meal in poultry and hog feeds.

Chart 4



This is evident in the accompanying table where we have added our estimate of the soybean meal equivalent of lysine/corn blend to USDA's estimates of U.S. disappearance of high protein feeds. Using the rule of thumb that 3 pounds of lysine plus 97 pounds of corn substitute for 100 pounds of 48 percent protein soybean meal, we estimate that in 1991/92 the soybean meal equivalent of 60,000 metric tons of U.S. lysine disappearance was two million

metric tons. That is double the amount four years ago. With continued growth, the importance of lysine/corn blend in the United States will soon exceed that of all high protein feeds other than soybean meal. We forecast 96,000 mt of lysine use in 1996, which would be the equivalent of 3.2 million metric tons of soybean meal.

Table 2

<u>U.S. High Protein Feed Use</u>				
	<u>1988/89</u>	<u>1989/90</u>	<u>1990/91</u>	<u>1991/92</u>
	-----million metric tons-----			
<u>Oilseed Meal</u>				
Soybean	17.8	20.5	21.0	21.1
Other	2.4	2.0	2.4	2.7
Lysine & Corn	<u>1.0</u>	<u>1.3</u>	<u>1.6</u>	<u>2.0</u>
Total	21.2	23.8	25.0	25.8
<u>Animal Proteins</u>	3.0	3.0	2.9	3.0
<u>Total</u>	24.2	26.8	27.9	28.8

Notwithstanding all the preceding discussion of "substitution" and "replacement", the long term effects on soybeans and U.S. agriculture are not easy to predict, and could even be positive rather than negative. The short-term effect is unquestionably negative. One can see it clearly in the previous table which shows that the 700,000 mt increase in use of lysine/corn mixture over the past two years exceeds the 600,000 mt increase in domestic soybean meal use.

But it would be incorrect to extrapolate these gains too far into the future. There are limits on substitution and one also has to consider the interactions that will take place within the grain-oilseed-animal sector. Discussions with commercial and university nutritionists indicate that it is currently difficult to go beyond 3 or 4 pounds of lysine per ton of feed because it becomes difficult to balance other parts of the ration. Moreover, the level of crude protein per se has proven to be important. These factors plus the generally favorable mix of amino acids in soybean meal ensure that it will remain the major protein source in U.S. rations for the foreseeable future. Whether new research will commercialize other synthetic amino acids like tryptophan and threonine and alter that conclusion remains to be seen.

The real question to be answered for the 1990's is whether you can "make it up on volume." U.S. red meat and poultry exports have begun to grow significantly in recent years because of product quality and price competitiveness. There is no question that synthetic amino acids improve both the technical and economic efficiency of meat production, and in this respect synthetic lysine and soybean meal are complements rather than substitutes. If feeds formulated with lysine can make livestock and poultry products more affordable for consumers in North America, the former Soviet Union, and developing economies around the world, demand for soybean meal could be augmented rather than reduced.

Outlook '93

For Release: Wednesday, December 2, 1992

THE SOYBEAN COMPLEX PRICE OUTLOOK

Richard A. Loewy
President AgResource Company

The most significant economic event for the next fifty years for the oilseeds, grains, the service and manufacturing sectors, and for world trade liberalization, will be the resolution or lack thereof of the linchpin, Section 301 of the Oilseeds debate, impeding the movement of the Uruguay Round of GATT, which if successful, should lead to diminished domestic and world export subsidies and possibly increase world trade to the tune of \$200 billion. The GATT talks wind down in March, 1993, and if the oilseed and grain subsidy and acreage/production problems can be worked out between the U.S. and the EC-12, then other world agricultural trade issues, such as the Japanese rice tariff dilemma, could facilely fall into place. The U.S. Congressional impetus to pass the NAFTA regional pact between the U.S., Canada and Mexico should move more swiftly, and should be operational by January, 1994, once 301 and GATT hopefully proceed to a successful conclusion.

The EC and the U.S. finally agreed on November 20 to resolve the sticky issue of EC oilseed acreage cutbacks versus production declines. The one current "fly in the ointment" is the French, who may veto, or at least "jawbone" the U.S./EC Agreement to extract certain concessions from the other 11 EC members to offset the loss incurred to French farmers. Moreover, with elections in March, 1993, the government has to straddle the fence between appeasing the farmers and maintaining the appearance of striving for EC unity. The French could invoke its veto power in a special clause drawn up 30 years ago (initiated by the French) to overturn any agreement, if the terms are inimical to the vital national interests of any member firm. If the other EC members can't successfully override the French veto by December 5, 1992 the U.S. will impose 200% import surcharges on EC rapeseed oil, white wine and wheat gluten calculated to bring \$300 million to the U.S. The U.S. has demanded \$1.0 billion as reparations for lost export business of U.S. soybeans and soybean meal to the EC. This would be phase one. Import surcharges would be imposed on another \$700 million of agricultural products, followed by tariffs on industrial products. In the meantime, the EC would likely impose import surcharges on U.S. soybean meal and corn meal gluten, and possibly soybeans.

However, in our judgment, the EC has to negotiate and accept the Agreement with the U.S. for the following two reasons:

(1) The U.S. is on an opposite soybean production cycle from Brazil and Argentina, which signifies that from October through March, the EC depends on U.S. importation of soybeans. Even if all three countries were on the same production cycle, the South American crushing industry would suffer severe adverse repercussions, due to the duress of having to export soybeans to the EC, leaving insufficient supplies to crush domestically. The EC crushing industry would be also be hurt by not obtaining soybeans from the world on a regular basis. Under current EC oilseed production levels, the EC cannot circumvent U.S. soybean imports. From 1980/81 through the present, the U.S. market share to the EC declined from the high level of 96% in 1981/82 (14.77 million MT's of a total 15.32 million MT's) to the low level of 52% (5.52 million MT's to a total of 10.60 million MT's) attained in 1990/91. We don't envision the U.S. market share declining below 50%. Our research indicated that in order to circumvent U.S. soybeans, the EC would have to augment subsidies for soybean production to the more southern producing states of Italy, Spain, Portugal, Greece and Southern France. The more northern producing states don't have adequate growing degree days to produce normal soybean yields. Italy has averaged 86% of total EC soybean production the past six years.

(2) The other alternative to avoid U.S. soybeans would be to encourage Brazilian soybean production in the Cerrados area, which comprises the following states in the northern producing areas: Mato Grosso, Mato Grosso Do Sul, Goias, Minas Gerais, Bahia, Tocantins, and Maranhao. The Cerrados region has the potential to produce soybeans on 50 million Hectares (123.5 million acres) roughly twice the total U.S. soybean acreage. Vegetation is minimal in this region and the land is virtually flat, which prompts low clearing costs. Also the infrastructure development of the internal transportation system (highways and railroads) will provide access to ports in the northeastern portion of the country, providing cheaper freight rates to the EC versus the U.S. The region has the availability of an abundance of limestone, which is indispensable for removing the acidity in the soil for proper planting procedures. The Japanese discovered some five years ago that by applying eight kilos per MT of limestone instead of four, soybean yields could rise from 10%-20%. The average yield from 1980-1984 was 1.676 (Kgs per Hectare) and rose to an average yield of 1.830 from 1985-1990 for an increase of 9.2%. This excludes the drought year of 1986. Record yields above 2.000 are forecast from the mid 1990's through the twenty first century. The newer producing states have the additional benefit of obtaining a regular flow of moisture for all months throughout the year, emanating from

the Amazon Basin, which has enabled the newer producing states to obtain higher yields than the traditional southern states of Rio Grande Do Sul, Parana, Sao Paulo, and Santa Catarina for every year since 1982, except for the drought year of 1990. Over time, this could prove to be a viable alternative for the EC.

Another reason that the EC is compelled to negotiate is the fear that the potential grain production emanating from the Eastern European nations, as a low cost producer, would significantly undercut the EC. AgResource prepared a grain export market share study by the Eastern European countries prior to becoming Communist from the period of 1925 through 1939. The Eastern European wheat and wheat flour export market share was 6.2% from 1925-1929, 6.2% from 1930-1934, 10.2% for 1937, 15.5% for 1938 and 17.0% for 1939. Eastern European corn exports to the world were 19.8% for 1925-1929, 19.5% for 1930-1934, 15.5% for 1937, 19.5% for 1938 and 10.8% for 1939. The barley export market share was 27.7% in 1925-1929, 40.3% in 1930-1934, 31.8% in 1937, 30.6% in 1938 and 35.9% in 1939. The purpose of the above exercise is to reveal that under the proper circumstances, the Eastern European nations, under a capitalist environment, could be a formidable exporter of grains to the world. The bottom line is that this would place severe stress on the already bloated EC budget. A comparative historical and forecast EC and U.S. agricultural budgetary expenditures is reflected below:

U.S. Versus EC Agricultural Spending \$ Billion

	1987	1988	1989	1990	1991	Est 1992	Est 1993
EC Community							
Export Subsidies	10.26	11.28	10.70	11.35	12.41	12.18	-
Domestic Supports	16.16	21.39	17.76	22.25	25.70	37.60	-
Total Subsidies	26.42	32.67	28.46	33.60	38.11	49.78	52.68
U.S.							
EEP	0.93	1.01	0.34	0.31	0.92	0.60	1.20
CCC Outlays	22.41	12.46	10.52	6.47	10.11	10.56	13.09
Total Subsidies	23.34	13.47	10.86	6.78	11.03	11.16	14.29

Notes: Note that the EC Agriculture budgetary outlays have doubled from \$26.42 billion recorded in 1987 to the estimated outlay of \$52.68 billion estimated for 1993. In the meantime, the U.S. expenditures appear to have stabilized at the range of \$10.0 to \$14.0 billion. A budgetary differential of \$38.0 billion between these two competing exporting countries/areas would necessarily force a retrenchment of outlays by the EC at some point in time. Moreover, the EC preoccupation of the Eastern European nations eventual grain production self-sufficiency and export potential further corroborated that it would have to negotiate. This was manifested, in our judgment, by the revision of the reduced CAP acreage levels espoused voluntarily by the EC members.

The U.S./EC agreed upon oilseed acreage restriction was 15%, and at least 10% in subsequent years. There is a permanent cap of some 5.128 million hectares (12.67 million acres) to be placed on EC oilseed area, earmarked to be attained by the 1995/96 crop year. Agriculture Secretary, Richard Madigan, projected that the actual oilseed volume would range between 8.5 to 9.7 million MT's or an average of 9.0 million MT's. This would represent an acreage decline of 30% from the benchmark level of 12.8 million MT's attained in 1991/92. Ag Resource research indicates that oilseed production levels will trend between 10.0-11.0 million MT's. The 1991/92 EC oilseed yield was 2.39 MT's per hectare. Utilizing the acreage restriction figure of 5.128 million hectares, a total oilseed production figure of 12.26 million MT's would be attained. 1986/87 was the crop year that the U.S. negotiators intended the EC to utilize as a maximum production level, which was 7.870 million MT's as reflected below:

EC Oilseed Production (1,000 MT's)

	Rapeseed	Snflrsd	Soybeans	Total
80/81	2,039	289	14	2,342
81/82	2,010	488	27	2,525
82/83	2,645	749	25	3,419
83/84	2,437	979	87	3,503
84/85	3,428	1,171	141	4,740
85/86	3,647	1,802	332	5,781
86/87	3,696	3,278	896	7,870
87/88	6,352	4,161	1,783	12,296
88/89	5,594	3,986	1,655	11,235
89/90	5,342	3,540	1,982	10,864
90/91	6,149	4,247	2,068	12,464
91/92	7,343	3,973	1,509	12,825
92/93*	6,257	4,295	1,307	11,859

*Estimate

It is important to have cognizance that the EC oilseed producing nations could set aside some extremely marginal land, that could have a negligible impact on reduced production levels. The key point to ponder is whether the EC Council, through the implementation of its policing mechanism, will have the power or the fortitude to adequately limit acreage. If not, The U.S. will extract minimal benefit from the acreage limitations, impacting on minimal U.S. increases of soybean and soybean meal exports. Consequently, the policing mechanism implemented by the EC council assumes paramount significance.

Conclusion: The EC problems of an exceptionally bloated agriculture budget, the eventual advent of a large, low cost, Eastern European grain producing region, and dependency on U.S. soybeans, all reflect that the EC cannot allow the special interests of one member to upstage the benefit that can be accrued to free world trade, along with EC unity. Consequently, in our judgment, and we will be better informed by December 5, the EC at all costs must override France, even if it means isolating France from the Community.

Soybean Complex Outlook-1992/93- U.S.

Soybeans- The size of the U.S. soybean crop will be reflected by the USDA on the January 12 report. The USDA November estimate was 2,167 million bushels indicating a planted acreage figure of 59.100 million acres, a harvested acreage figure of 58.078 million acres for an abandonment rate of 1.7% and a record yield of 37.3 bushels/acre, a full 3.0 bushels/acre above the prior 1991/92 record of 34.3. The record yield was reflective of the optimal moisture levels throughout the entire soybean belt during the critical growth months of July and August, along with the decline in planted acreage to 11.965 million acres for the 1992/93 crop from 24.548 million acres in 1981/82, a decline of 51.3%. in the lowest yielding areas of the Southeast, Delta and Appalachian regions. The average yield the past 12 years for the Delta, Southeast and Appalachia has been respectively 23.5, 21.5 and 26.2 bushels/acre. The acreage decline in these three regions accentuated the higher yielding regions of the Corn Belt, Lake States and Northern Plains. AgResource studies on the demise of southern acreage and technological advances prompted utilization of a trend yield of 35.0 bushels per acre for 1991/92 and 1992/93. The ARC trend yield forecast for 1993/94 is 36.0 bushels/acre.

Since 1965, there were nine crop years that registered production increases from the USDA October, November and final reports. The following reflects these increases:

**U.S. Soybean Production
Month-To-Month Changes
(Million Bushels)**

	Oct 1	Nov 1	Oct/Nov Increase	Final	Nov/Final Increase
1968/69	1,066	1,079	13	1,107	28
1969/70	1,070	1,094	24	1,133	39
1975/76	1,474	1,520	46	1,548	28
1976/77	1,250	1,252	2	1,289	37
1977/78	1,647	1,683	36	1,767	84
1978/79	1,792	1,810	18	1,869	59
1983/84	1,517	1,537	20	1,636	99
1988/89	1,501	1,512	11	1,549	37
1991/92	1,934	1,962	28	1,987	25
Average			22		48

Note that the average November/Final figure for the nine years was 48 million bushels. However, ARC research indicates a final crop size of 2,132 million bushels, still reflecting a record yield of 36.7 bushels acre. The delayed harvest in the northern Plain States of Minnesota, the Dakotas, Michigan and Wisconsin should impact on lower January yields. The USDA, according to our research, reported close to final yield in the Delta, Southeast and Midwest. The swing factor should be the Northern Plain States.

The 1992/93 U.S. supply figure of 2,412 million bushels would be the highest since the figure of 2,478 million bushels recorded in 1986/87. Below is forecast the ARC U.S. soybean supply-disappearance balance.

**U.S. Soybean Supply/Disappearance Balance
September/August Crop Year
(Million Bushels)**

	89/90	90/91	91/92	USDA 92/93	ARC 92/93	ARC 93/94
Beginning Stox	182	239	329	278	278	348
Production	1,924	1,926	1,987	2,167	2,132	2,138
Imports	3	2	3	2	2	3
Total Supply	2,109	2,167	2,319	2,447	2,412	2,489
Crush	1,146	1,187	1,254	1,265	1,247	1,225
Exports	623	557	685	730	719	695
Feed/Seed/Res	101	94	102	102	98	102
Total Disapp	1,870	1,838	2,041	2,097	2,064	2,022
End Stocks	239	329	278	350	348	467
Stock/Use ratio	0.13	0.18	0.14	0.17	0.17	0.23

Notes: The very preliminary 1993/94 U.S. soybean acreage estimate is 60.600 million acres, reflecting an acreage increase of 1.5 million acres. The 10% corn ARP Program is forecast by ARC to reduce corn acreage from 79.3 to 74.8 million acres. The flexi acreage will go to soybeans, so it becomes a question of how much soybean acreage will increase. The ARC price forecast of soybeans to farmers by the spring is \$5.75 versus \$2.00 for corn for a ratio of 2.74:1.0, above the breakeven level of 2.5:1.0.

U.S. Disappearance for 1992/93-Crush - The crush rate will continue for soybean meal, but soybean meal disappearance is forecast to diminish by 389 thousand Short Tons. Consequently, the annual crush rate is forecast at 1,247 million bushels versus 1,265 million bushels for the USDA. The ARC quarterly 1992/93 crush forecast is reflected below:

**ARC U.S. Quarterly Crush Forecast
(Million Bushels)**

Sep-Nov	326.9
Dec-Feb	327.0
Mar-May	298.1
Jun-Sep	295

Total	1,247.0
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Notes: The September-November crush forecast of 326.9 million bushels would be a record, 22.7 million bushels above the prior record crush of 304.2 million bushels established in 1990/91. The ARC December-February crush estimate of 327.0 million bushels would also be a record, 9.7 million bushels higher than the 1987/88 quarterly figure of 317.3 million bushels. The ARC subsequent two quarterly rate decline is based on historical declines of 2% for the last six months of the crop year, along with optimal growing conditions for the Brazilian and Argentine soybean crops and for the EC winter rapeseed crop. Regardless of the EC/U.S. outcome of the trade dispute, which will probably earmark 1994 as the first year of the Agreement, the EC for 1993/94 will plant fence-row to fence-row for the rapeseed and sunflowerseed crops to offset the poorer 1992/93 production results. If both Southern Hemisphere and the EC produce better than normal yields, which appears to be the case, Southern Hemisphere exports of soybeans and products will expand and the EC imports of oilseeds and protein will diminish.

Exports - The ARC export estimate of 719.2 million bushels would be the largest figure, since the 799.5 million recorded in 1987/88. The ARC Sept-Dec estimate of 317.5 million bushels would be the fifth highest: 1979/80, 1981/82, 1982/83, and 1987/88. The early crop year U.S. soybean export pace reflects the strong export commitments to the EC. Total EC commitments as of November 12 of

159 million bushels were 40% of the total commitment figure of 395 million bushels. This is in line with the ARC U.S. export estimate for 1992/93 of 297 million bushels to the EC of total exports of 719 million bushels(41%). The EC was beset by a drought in the northern European sunflowerseed and rapeseed growing areas, augmenting EC oilseed/protein import requirements. The EC import requirements were further accelerated by the record U.S. dollar weakness versus the EC currencies, which fomented imports of U.S. products by individual EC members. An additional factor was that protein/oilseed prices in the EC were cheaper than grains, creating more internal disappearance. Some front loading occurred as early as the spring in fear of an oilseed trade war. Brazil registered a record soybean export figure of 1.088 million MT's during May, of which 80.2% of the soybeans were shipped to the EC. Brazil is currently out of exportable soybeans until April, and the remaining Argentine export prospects of some 150-250 thousand MT's will be earmarked for Brazil to meet its own export commitments. Argentina won't have exportable soybeans to the world until next May. This enhances U.S. export prospects through the April/May period. The other opportunity for U.S. exports of both soybeans and soybean meal has been the harvest delays and increased protein demand in the Pacific Rim nations. India and Mainland China will more aggressively pursue soybean meal exports from December onwards. On a October/September basis, the combined U.S. Brazil and Argentine soybean export pace for 1991/92 was 26.41 million MT's, the largest total since the 27.03 million MT's recorded in 1982/83. The total EC import figure of 12.82 million MT's was the largest since the 13.08 million MT figure recorded in 1987/88. Below is reflected the 1991/92 world trade soybean matrix.

**Combined U.S., Brazil and Argentine Soybean Exports
By Country Of Destination
1991/92 (Oct-Sep)
(Million Metric Tons)**

Importing Nation	Argentina	Brazil	U.S.	Total
EC-12	2.30	3.25	7.27	12.82
Other West Europe	0.07	0.04	0.19	0.30
East Europe	0.00	0.00	0.14	0.14
CIS	0.00	0.00	0.68	0.68
Canada	0.00	0.00	0.03	0.03
Mexico	0.02	0.02	2.15	2.19
Venezuela	0.00	0.00	0.06	0.06
Brazil	0.18	0.00	0.03	0.21
Other W. Hemisphere	0.00	0.00	0.29	0.29
Mainland China	0.02	0.01	0.00	0.03

Importing Nation	Argentina	Brazil	U.S.	Total
Japan	0.05	0.45	3.59	4.09
Taiwan	0.13	0.00	2.04	2.17
S. Korea	0.00	0.04	1.22	1.26
Israel	0.00	0.00	0.46	0.46
Indonesia	0.05	0.02	0.14	0.21
Other Asia	0.12	0.04	0.24	0.40
Africa	0.22	0.00	0.04	0.26
Others	0.01	0.00	0.80	0.81
Total	3.17	3.87	19.37	26.41

The end stock estimate of 348 or 350 million bushels for a stock/use ratio of 17% does not reflect historically an average soybean farm price level above a \$5.00-\$5.25 range. However, the probable record U.S. export plus crush rate forecast from September through at least December of 756.2 million bushels should keep the market firm through the February/March timeframe. Farm prices should trend up to the \$5.75-\$5.80 level and at least \$6.00 on the CBOT. This should mark the top of the soybean market, particularly if the South American crops come to fruition as it appears early in the game. World soybean production is projected below:

World Soybean Production
Principal Producing States
(Million MT's)

Major Exporters	89/90	90/91	91/92	USDA 92/93	ARC 92/93
U.S.	52.4	52.4	54.1	59.0	58.0
Argentina	10.7	11.5	10.8	10.8	11.0
Brazil	20.3	15.8	19.1	19.8	21.5
Paraguay	1.6	1.3	1.2	1.6	1.7
Sub-Total	85.0	81.0	85.2	91.2	92.2
Other Foreign					
Canada	1.2	1.3	1.5	1.5	1.4
Mainland China	10.2	11.0	9.7	9.7	9.8
E.Europe	0.7	0.4	0.3	0.2	0.5
India	1.7	2.4	2.2	2.5	2.3
Indonesia	1.3	1.3	1.5	1.5	1.3
Mexico	1.0	0.6	0.6	0.4	0.6
CIS	1.0	0.9	0.9	0.9	0.9
Others	5.2	5.0	4.2	4.2	5.0
Sub-Total	22.3	22.9	20.9	20.9	21.8
Total	107.3	103.9	106.1	112.1	114.0

Notes: The ARC 1992/93 world soybean production estimate of 114.0 million MT's would be a record, a significant 6.7 million MT's higher than the 107.3 million MT figure recorded in 1989/90. Also the three South American country production estimate of 34.2 million MT's would also be a record. Brazil will be the principal country of focus, since Paraguay and Argentina are relatively stable.

The Brazilian crop is off to an excellent start with farmers taking advantage of the large credit allocations and the higher minimum prices of soybeans versus corn for the first time in three years. The Collor Administration for the prior two crop years had encouraged the planting of the domestically grown crops of corn rice and black beans to discourage imports, which would have adversely impacted on balance of payments, in a scenario of a profound austerity program with little slack permitted on higher imports. With a bumper corn crop for 1991/92, the shift of focus was on enhancing the soybean industry for both crushers and exporters, and at the same time encouraging soybean plantings versus corn. This policy, barring any droughts, should be intact the for at least the next two crop years, particularly if the French force a trade war with increased EC dependency on Brazilian soybeans. The derived ARC 1992/93 Brazilian soybean production is reflected in Table 8. Note the acreage increase estimate of 10.4%.

Brazilian Soybean Production February/January Crop Year

	Hrwd Acreage (Mil Hectares)		Yield Kgs/Hectare		Production (Mil MT)	
	91/92	92/93	91/92	92/93	91/92	92/93
Sao Paulo	0.465	0.507	1.936	2.122	0.900	1.076
Parana	1.791	1.952	1.954	2.264	3.500	4.419
Snt Catarina	0.204	0.229	1.735	1.904	0.354	0.436
Rio Grande						
Do Sul	2.900	3.161	1.869	1.788	5.420	5.653
Total Trad'l	5.360	5.849	1.898	1.981	10.174	11.584
Maranhao	0.019	0.021	1.579	1.905	0.003	0.004
Bahia	0.320	0.358	1.588	1.735	0.508	0.621
Minas Gerais	0.500	0.560	2.200	2.150	1.100	1.204
Mato Gr.						
Do Sul	0.980	1.098	1.939	2.120	1.900	2.328
Mato Grosso	1.450	1.624	2.276	2.250	3.300	3.654
Goiias	0.830	0.930	2.193	2.151	1.820	2.000
Fed Dist	0.042	0.047	2.262	2.128	0.095	0.100
Tocantins	0.012	0.013	1.917	1.923	0.023	0.025
Total New	4.153	4.651	2.107	2.136	8.749	9.936
Total Brazil	9.513	10.500	1.989	2.050	18.923	21.520

Soybean Meal - The U.S. Supply/Disappearance balance is reflected below:

U.S. Annual Soybean Meal Supply/Disappearance Balance
October/September Crop Year
(1,000 Short Tons)

	89/90	90/91	91/92	USDA 92/93	ARC 92/93
Supply					
Beginning Stocks	173	318	285	230	230
Production	27,719	28,325	29,831	30,050	29,585
Imports	8	23	64	50	25
Total Supply	27,900	28,666	30,180	30,330	29,840
Disappearance					
Domestic Use	22,558	22,912	23,300	24,030	23,017
Exports	5,024	5,469	6,650	6,000	6,624
Total Disappearance	27,582	28,381	29,950	30,030	29,641
End Stocks	318	285	230	300	199
Decatur, Solvent					
44% Protein	\$173.75	\$169.90	\$187.88	\$165- \$190	\$175- \$200

The ARC soybean meal 1992/93 yield estimate is 47.45 versus the average of 47.50 for 1991/92. Protein yields are not adversely impacted by cool moist conditions, which is the reverse for soybean oil. The lower ARC crush rate of 1,247 million bushels and slightly lower yield would produce a production figure of 29,585 thousand short tons versus the USDA estimate of 30,050 thousand short tons.

Exports - The USDA U.S. soybean meal export estimate including hulls is 6,000 thousand short tons versus the ARC estimate of 6,624 thousand. The breakdown of exports by country of destination comparing 1991/92 and 1992/93 is presented in the following table.

U.S. Soybean Meal Exports By Country of Destination
October/September Crop Year
(1,000 Short Tons)

	1991/92			1992/93		
	Soy Meal	Hull	Total	Soy Meal	Hulls	Total
EC-12	389	515	904	415	538	953
Other						
W. Europe	37		37	105		105

	1991/92			1992/93		
	Soymeal	Hull	Total	Soymeal	Hulls	Total
E. Europe	91		91	150		150
CIS	2,388		2,388	1,513		1,513
Canada	651	1	652	575	3	578
Mexico	410	1	411	385	1	386
Venezuela	482		482	575		575
O.W.Hem.	534		534	555	2	557
Japan	98	2	100	195		195
S. Korea	74		74	200		200
Indonesia	22	1	23	35		35
Philippines	321		321	405		405
O. Asia/Oce.	171	1	172	195	1	196
Africa	1		1	1		1
Algeria	273		273	325		325
Egypt	49		49	75		75
Others	433		433	375		375
Total	6,424	521	6,945	6,079	545	6,624

For 1992/93, the CIS portends to import less world soybean meal, due to continued liquidation of the livestock herds and the low volume earmarked for Russia during the October-December tranche of 200,000 MT's. Also, the fact that there are 167 thousand MT's outstanding to the CIS, reflects that there is no hurry to purchase U.S. origin soybean meal, at least on the short-term. Moreover, the credit situation could deteriorate, which would further impede the U.S. shipments of grains and oilseeds there. The current ARC export estimate to the CIS is 1.513 million Short Tons, some 872 thousand less than for 1991/92. The forecast is based on a total of 100,000 MT's per month from January through September, and a total of 100,000 MT's to the other Republics. The other destination business is forecast by ARC to increase 530 thousand Short Tons from 4,036 for 1991/92 to 4,566 thousand for 1992/93. This reflects the increased domestic disappearance in the Pacific Rim nations, in conjunction with the soybean harvest delay in Mainland China. Consequently, as can be gleaned from the above table, higher projected exports to Japan, South Korea, Indonesia, the Philippines and the other Asia/Oceania categories, along with the increased estimates to the EC, and Western Hemisphere, suffice to prompt a total 1992/93 export pace of only 300,000 Short Tons below 1991/92. Obviously if the CIS were to pick up the imported soybean meal pace from the U.S. or through barter transactions with South America, the crush pace estimate would have to rise.

Another prospective net benefit for the U.S. is that the Brazilian soybean meal export pace has declined precipitously during November, and could be hard pressed to attain 250 thousand MT's, which would be the low month of the crop year. Activity should remain at low levels until next May. The export pace is also diminishing in Argentina.

Domestic Disappearance - The 1992/93 domestic disappearance figure should be a record or close to a record, which in part will depend on the extent of the export pace, and in part the negative repercussions of having corn gluten meal competing against soybean meal in the event of the trade war. The environment is conducive for excellent domestic use figures. The large Hog and poultry inventory numbers for 1992/93, the lack of competition from rapeseed meal and cottonseed meal and the prospective colder-than-normal winter should all abet higher domestic soybean meal use. However, ARC believes that the USDA is overly optimistic on the forecast of 24,030 thousand Short Tons, but recognizes that all the factors are in place to attain this high level. Moreover, the October implied domestic use figure was 1,945 thousand short tons, which would be the fourth largest historical figure.

The price outlook for 1992/93 is for a range of \$175 to \$200 a short ton basis Decatur(48%) protein. The upside price potential could be explosive if the CIS imports larger-than-expected volumes from the U.S., or if domestic use figures approach the USDA forecast.

Soybean Oil - Soybean oil stocks domestically could follow suit on the decline of the other world vegetable oil stocks. The record U.S. soybean oil stocks for 1991/92 of 2,230 million pounds is forecast to dwindle to 1,299 million pounds, representing a decline of 42%. The U.S. supply/disappearance balance sheet is reflected below:

U.S. Soybean Oil Annual Supply/Disappearance Balance
October/September Crop Year

	89/90	90/91	91/92	USDA 92/93	ARC 92/93
Supply					
Beginning Stocks	1,715	1,305	1,786	2,230	2,230
Production	13,004	13,408	14,345	14,293	13,555
Imports	22	17	0	2	2
Total Supply	14,741	14,730	16,131	16,525	15,787
Disappearance					
Domestic Use	12,083	12,164	12,251	12,600	12,550
Exports	1,353	780	1,650	1,775	1,850
Total					
Disappearance	13,436	12,944	13,901	14,375	14,400
End Stocks	1,305	1,786	2,230	2,150	1,387
Average					
Soy Oil Yield	11.17	11.17	11.43	11.30	10.80
Price/Lb. Decatur	22.30	21.00	19.10	18.00- 21.00	19.00- 23.00

The stock decline is part of the projected soybean oil yield of 10.80, and along with a crush estimate of 1,247 million pounds the production figure would be only 13,467 million pounds, a reduction of 878 million pounds from the prior year. The cool moist spring adversely impacted on soybean oil yields, in spite of the record soybean yield. The USDA is currently estimating a yield of 11.30. The October Census implied soybean oil yield was 10.87. The USDA will be compelled to lower the yield on the December 10 supply/disappearance balance.

Domestic Disappearance - This category should be a record figure, projected by ARC to attain a level of 12,550 million pounds. Soybean oil prices continue to be competitive with the other vegetable oils, and the prospects are good that this trend will continue, until increased palm oil production levels surface in Malaysia in April. The shortfall in the U.S. cotton, sunflower and peanut crops, along with the Canadian canola and EC rapeseed and sunflowerseed production declines and quality problems portends to allow more than ample U.S. soybean oil stocks to result in competitive price levels. Proctor and Gamble, who switched its Crisco product from a 100% soybean oil base to a reduced 20% soybean oil mix last year, utilizing principally rapeseed oil, is contemplating shifting to more soybean oil to allude the 2.5 cent per pound canola oil premium. All of a sudden the lower cholesterol content in rapeseed oil versus soybean oil, is accorded a lower priority. Our research indicates that corn oil could become competitive in the next few weeks, reflecting the record U.S. corn crop. The October Census figure implied a record monthly domestic use figure of 1,219 million pounds, higher than the 1,211 million pound figure recorded in October of 1990.

Soybean Oil Exports - Below is the U.S. export forecast by Country of Destination for 1992/93 compared to 1991/92.

U.S. Soybean Oil Exports By Country Of Destination
October/September Crop Year
(Million Pounds)

Country/Area of Destination	91/92	Estimated 92/93
Other W. Europe	181	100
CIS	202	264
Bangladesh	0	22
India	149	50
Israel	1	1
Japan	1	1
Pakistan	1	220
Mainland China	44	44
Thailand	3	0

Country/Area of Destination	91/92	Estimated 92/93
Other Asia	7	4
Morocco	281	250
Other Africa	459	448
Canada	25	22
Dominican Republic	56	88
Haiti	10	12
Mexico	52	88
Panama	25	26
Other C. Amer & Cari	63	59
Colombia	1	5
Ecuador	1	45
Peru	72	70
Other S. America	4	5
Other Oceania	1	0
Others	9	26
Total	1,648	1,850

The September Census Export figure of 142.5 million pounds once again revealed large donations of some 70 million pounds for the month with the thrust oriented for the African countries. The total 1991/92 export figure was 1,648 million pounds, the largest export figure since the 1,658 million pound figure was recorded in 1988/89. The annual figure was a significant increase of 868 million pounds or 111% ahead of the 1990/91 figure of 780 million pounds. The aggressiveness of the soybean oil EEP Program paid dividends, and should be a continuing impetus for 1992/93 to targeted countries such as the Dominican Republic, Turkey, Algeria, Morocco (the current largest importer of U.S. soybean oil), Tunisia, and the CIS. Pakistan has the opportunity to purchase some 100,000 MT's via the Pl 480 offer of \$50 million. The lion's share of the export business to Pakistan should be accomplished the last six months of the crop year. The ARC estimate of 1,850 million pounds should virtually be the increased exports to Pakistan. Lower U.S. exports are projected for India and Turkey.

Conclusion: Soybean prices should be buoyed to the \$6.00 to the \$6.25 level, as crush continues for soybean meal. However, due to improved estimates for domestic use of soybean oil amid exports, along with lower soybean oil yields, stocks could decline almost 900 million pounds. Consequently, soybean oil stocks won't be the albatross weighing on soybean prices as what occurred in 1991/92. Soybean oil prices are projected to rise to 23 cents with a low of 19 cents. If higher than the ARC CIS import demand for soybean meal surfaces, or if the USDA domestic disappearance of soybean meal comes to fruition, soybean meal prices could trend to \$200.00, which could allow cash soybean prices to farmers to trend to \$6.00. This optimistic price outlook is in view in spite of record world

soybean production prospects, including record soybean production earmarked collectively for the three South American countries. Better EC and Canadian sunflower and rapeseed crops can be expected next year, along with Malaysian Palm oil. Consequently, the better price scenario must occur before the spring, prior to the advent of Southern Hemisphere crops. If the trade war ensues this week, prices will drift to lower levels.

Outlook '93 For Release:

Wednesday, December 2, 1992

BIOTECHNOLOGY: SOWING THE SEEDS FOR BETTER AGRICULTURE**Barry D. Teater****Public Affairs Manager, North Carolina Biotechnology Center**

The North Carolina Biotechnology Center carries out a wide range of activities to educate and inform people about the science, applications and issues of biotechnology. One of our products is the videotape "Biotechnology: Sowing the Seeds for Better Agriculture," which you are about to see.

The 16-minute video is a layman's introduction to plant agricultural biotechnology and the potential of genetic engineering. It focuses on Ciba-Geigy's 1990 field test of insect-resistant tobacco in North Carolina. The tape was produced by the Center with funding from Ciba-Geigy, which has its worldwide agricultural biotechnology research center in Research Triangle Park, North Carolina.

Copies of the video and a companion guide can be borrowed at no charge or bought for \$20, prepaid. For copies, write to the North Carolina Biotechnology Center, P.O. Box 13547, Research Triangle Park, N.C. 27709. Phone 919-541-9366.

Outlook '93

For Release: Wednesday, December 2, 1992

**CONSUMER KNOWLEDGE AND ATTITUDES
ABOUT BIOTECHNOLOGY**

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Introduction

Biotechnology is expected to have significant economic and societal benefits. It has the potential to improve agricultural productivity and enhance the food supply. However, this potential will be realized only if consumers accept the use of these new technologies for food production. Consumers must have confidence that the products of agricultural biotechnology are safe and effective. They also need to believe that the use of biotechnology is ethically and socially acceptable.

The use of biotechnology in food production and processing is advancing rapidly. Investment in research and product development by the public and private sectors is substantial. Many new products will be entering the market soon. New policies have elevated public awareness of and interest in this topic. With increased visibility, controversies are developing over the uses and implications of biotechnology.

Biotechnology is developing within a larger context of consumer concerns about health and environmental problems, especially those attributed to technology. Consumers are becoming increasingly concerned about food safety. The use of biotechnology in agriculture and food production could elicit concerns similar to those expressed about agricultural chemicals. In addition, other dimensions of biotechnology will also draw public attention (e.g., socio-economic impacts and ethical concerns).

Ultimately, the outlook for biotechnology depends on whether consumers accept food produced through biotechnology as safe, beneficial, and ethically sound. Acceptance of such food products, in turn, depends upon a much greater commitment to education, based on a detailed assessment of consumer attitudes and knowledge. Consumer response will not be fully understood until products appear on the market. Social science research can, however, provide advance guidance about this response.

Telephone Survey Results

This paper presents selected results of telephone interviews conducted with 1228 people selected at random from across the country. All interviews were completed during Spring 1992. With this sample size, we are confident that the survey results reflect the U.S. population within a margin of error of plus or minus three percent. Comparisons with 1990 Census data indicate that the sample is representative along most major dimensions. Only people at least 18 years old were interviewed. Within a particular household, individual respondents were randomly selected.

Initially, respondents were asked about traditional methods of crop and livestock improvement through breeding. Just over half of the respondents had heard or read either a lot or some about crossbreeding. Almost as many reported little or no awareness of cross breeding. Recognition of the term "biotechnology" was fairly low. Just over a third had heard or read either a lot or some. Most said they had heard a little or nothing when presented only with this definition. After several applications of biotechnology were described, respondents were asked, how much they had heard or read about any of those uses of biotechnology. In this case, awareness was higher than for the term itself. Almost half the respondents reported having heard or read either a lot or some about the possible uses of biotechnology. Just over half still said they had heard or read only a little or nothing. The three questions about awareness are summarized in Figure 1.

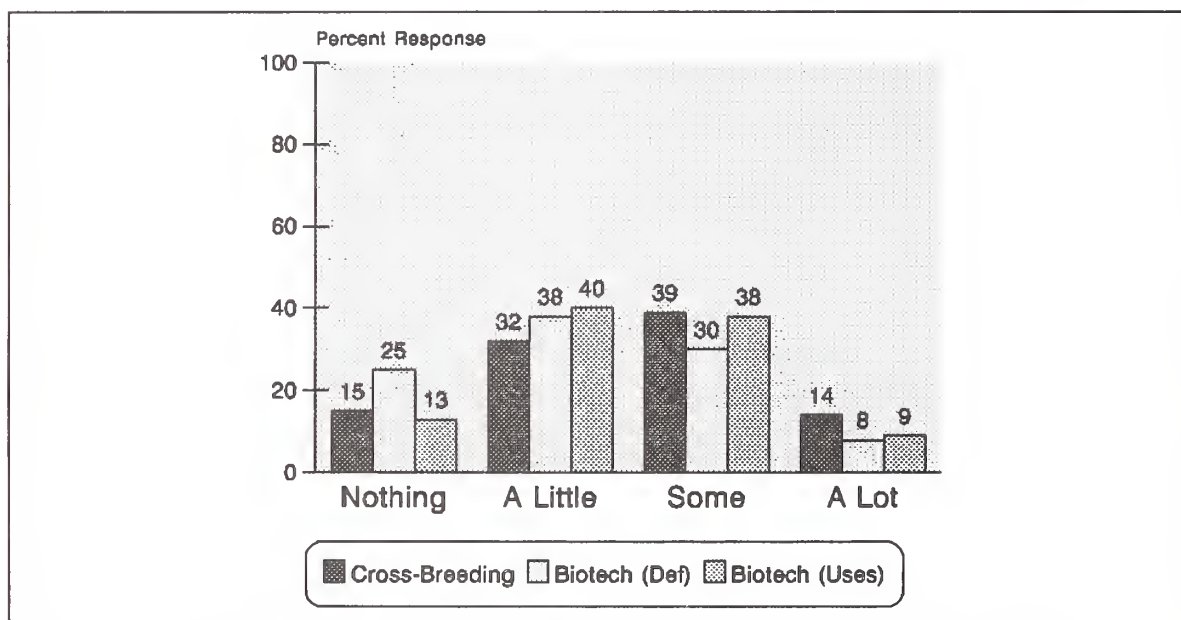


Figure 1. Percentage of respondents who had read or heard different amounts about crossbreeding and biotechnology

Respondents were read several statements about the benefits and risks of biotechnology and asked the extent to which they agreed or disagreed. Several of these indicate high expectations on the part of the public concerning the potential benefits of biotechnology. Almost three quarters either agreed (66 percent) or strongly agreed (5 percent) that "Biotechnology will personally benefit people like me in the next five years." On a related statement, over two thirds either agreed (60 percent) or strongly agreed (8 percent) that "Government should fund more biotechnology research because of the potential benefits." About two thirds either disagreed (62 percent) or strongly disagreed (5 percent) that "Only the companies that make products will benefit from biotechnology."

To assess respondents' acceptance of the specific products of biotechnology, they were asked: "On a scale of 1 to 5, where 1 is unacceptable and 5 is acceptable, how do you feel about the use of biotechnology to make: (Each of eight applications was then read)?" A variety of biotechnology applications were selected, most of which are currently in the field trial or product development stages. To simplify presentation, a rating of "1" or "2" indicates unacceptability, "3" indicates a neutral rating, and "4" or "5" indicates that respondents find a particular application of biotechnology acceptable. The responses to this question (with short-hand labels for the applications) are shown in Figure 2.

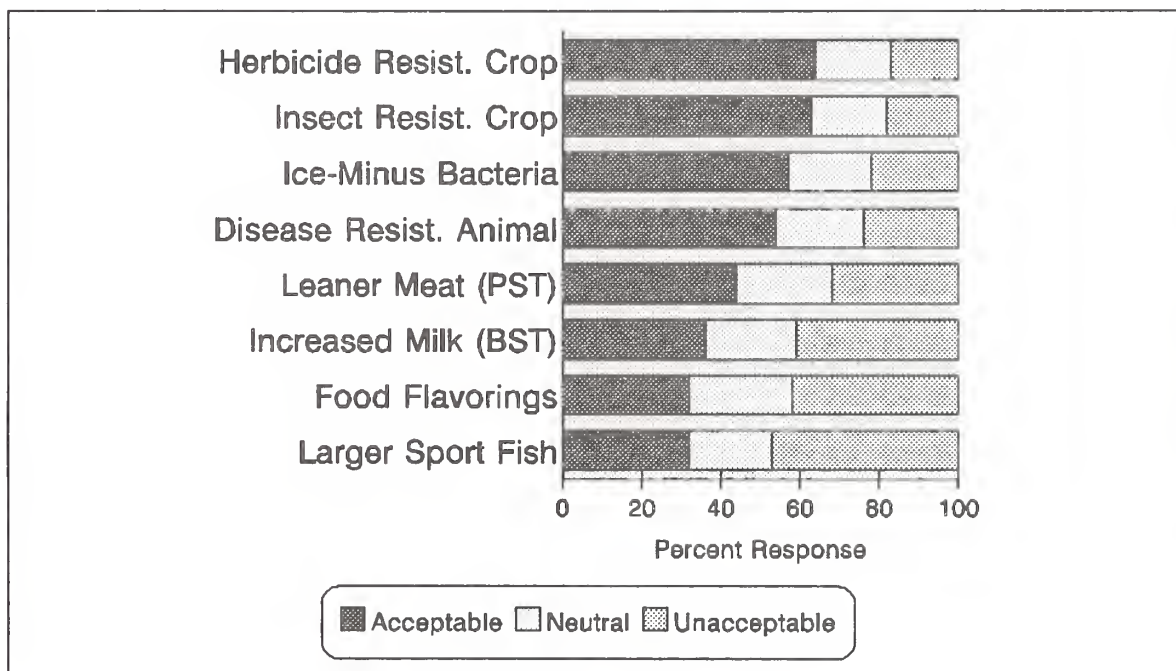


Figure 2. Percent of respondents accepting the use of biotechnology to make products related to agriculture and food production

Four applications of biotechnology appear to be relatively acceptable to consumers. Over three quarters rated the use of biotechnology to make each of the following as acceptable or were neutral: cotton plants that resist damage from the use of weed control chemicals; food crops that resist insect damage; bacteria that prevent frost damage to crops; and farm animals that resist disease. In fact, over half of all respondents rated each of these applications as "acceptable." The two plant applications were acceptable to almost two-thirds of the respondents. The four other applications of biotechnology appear to be less acceptable. These included: compounds that produce leaner meat when given to farm animals; compounds that increase milk production when given to dairy cows; food ingredients such as flavorings; and sport fish that grow larger. Less than half the respondents rated each as acceptable. One-third or more rated these applications as "unacceptable".

The interview then moved into a more complex area involving consumer acceptance of food products that involved clearly transgenic characteristics. Again, examples were used that reflected either actual applications or ones that were representative. These questions were sequenced to move from the least dramatic to most dramatic examples. Respondents were not asked to rate these applications on a scale of one to five, but were asked if each product was acceptable or not (Figure 3).

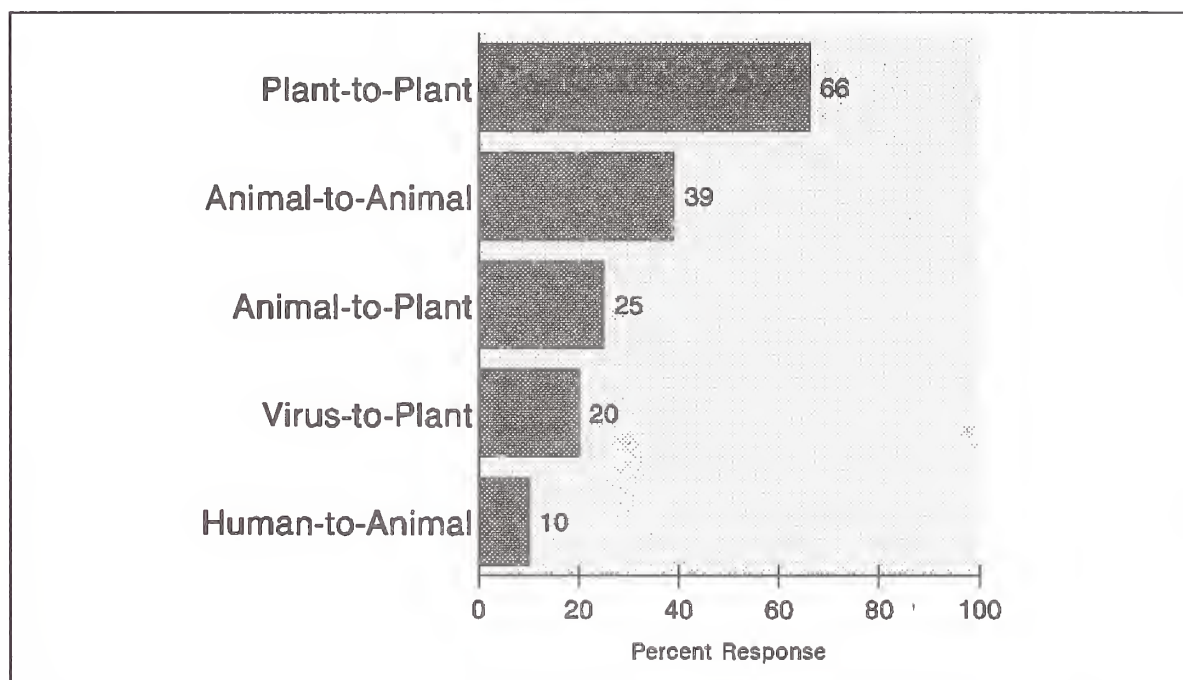


Figure 3. Percentage of respondents accepting different transgenic applications of biotechnology.

This set of questions was introduced with the following statement: "Genes from most types of organisms are interchangeable." Next respondents were asked "Would potatoes made more nutritious through biotechnology be acceptable or unacceptable to you if genes were added from another type of plant, such as corn?" Two thirds of all respondents said they would find such plant-to-plant gene transfer acceptable. Respondents were next asked "Would such potatoes be acceptable or unacceptable to you if the new genes came from an animal?" In this case, only one quarter of all respondents indicated they would find such animal-to-plant gene transfer acceptable.

To gauge reaction to another plant application, respondents were asked, "Would tomatoes made better tasting through biotechnology be acceptable or unacceptable if genes were added from a virus?" In this case, the source of the genetic material was a virus (which likely had a negative connotation). Only 20 percent of respondents said they would find such a virus-to-plant gene transfer acceptable.

Two examples were used to determine reaction to animal-related gene transfers. First, respondents were asked: "Would chicken made less fatty through biotechnology be acceptable or unacceptable if genes were added to the chicken from another type of animal?" In this case, almost 40 percent of the respondents said they would find such a gene transfer acceptable. As a final, relatively dramatic (but technically feasible) application, respondents were asked: "Would such chicken be acceptable or unacceptable if the genes came from a human?" This was almost completely unacceptable. Only 10 percent of all respondents indicated that such human to animal gene transfer would be acceptable.

The next questions assessed whether respondents would have moral objections to the use of biotechnology in either animal or plant applications. The first question asked: "Do you believe the use of biotechnology to change plants is morally wrong or not?" In this case, almost one quarter of the respondents felt that it would be morally wrong. Respondents had very different views concerning the moral aspects of animal biotechnology. When asked "Do you believe the use of biotechnology to change animals is morally wrong or not?" over half (53 percent) said that it was.

Another set of questions examined the area of government credibility. Respondents were asked: "Several government agencies regulate biotechnology. Do you have a lot of confidence, some confidence, or no confidence in (Name of each agency was mentioned) to effectively regulate biotechnology?" Results are shown in Figure 4. Overall, respondents have about the same level of confidence in each of the agencies. In all cases, about two-thirds of the respondents reported "some" confidence. The percent reporting "no confidence" exceeded the percent indicating "a lot" of confidence. The highest confidence was expressed in the U.S. Department of Agriculture, whereas the lowest confidence was expressed in state government agencies. Such differences are quite small.

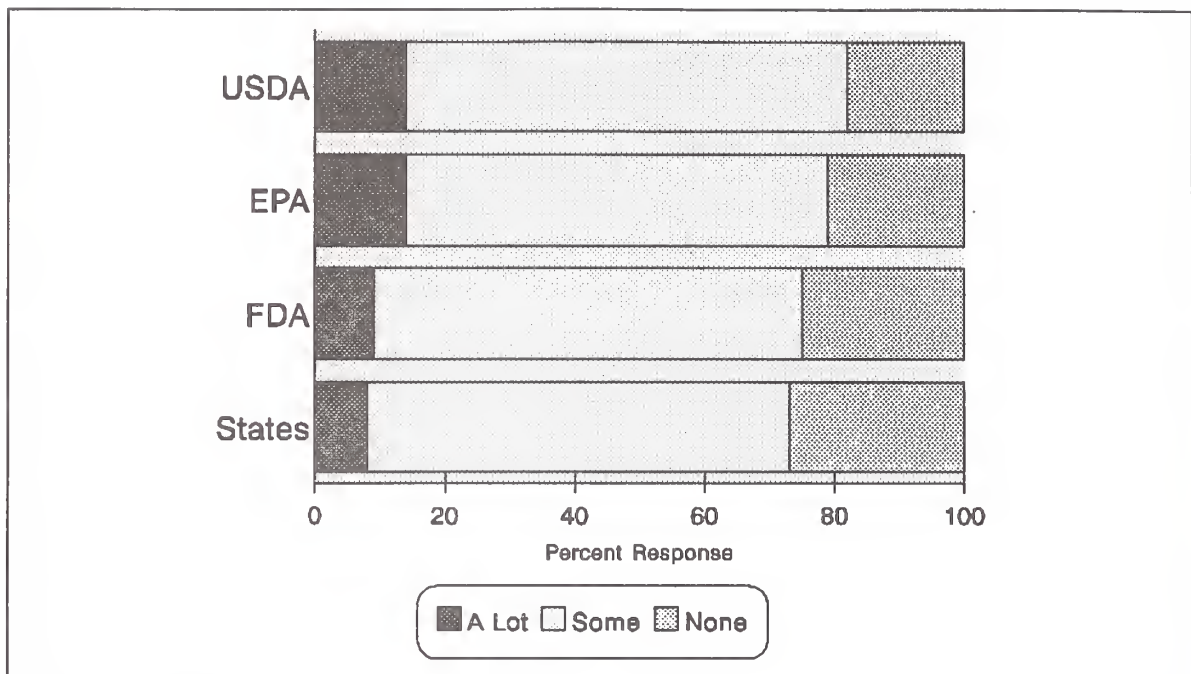


Figure 4. Percentage of respondents that expressed various levels of confidence in government to effectively regulate biotechnology.

Two statements measured respondents' opinions about the role of citizens in biotechnology decisions. Over three quarters either agreed (65 percent) or strongly agreed (17 percent) that "Citizens have too little say in decisions about whether or not to use biotechnology." On a related point, almost all respondents agreed (73 percent) or strongly agreed (20 percent) that: "Government should pay more attention to what people like me think about biotechnology."

There seems to be a fair amount of interest among respondents in learning more about biotechnology. One in five (20 percent) said they had a lot of interest in learning more about biotechnology. Almost half (46 percent) reported some interest. One in five had only a little interest and the remaining 14 percent said they had no interest in learning more about biotechnology.

Those respondents who reported at least "a little" interest in learning more about biotechnology were then asked how important it would be to receive each of six different types of information regarding biotechnology. The question read: "Is information about (Each topic was read) very important, somewhat important, or not important to you?" Results are presented in Figure 5.

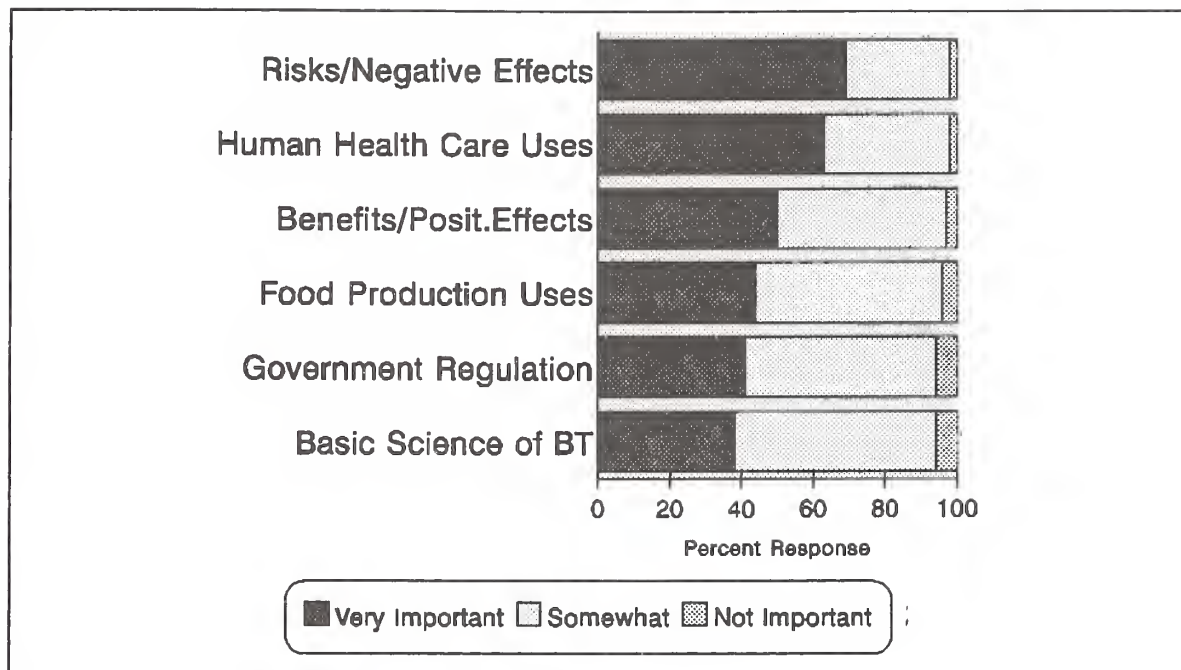


Figure 5. Percentage of respondents that attributed various levels of importance to different types of information about biotechnology.

Over two thirds of the respondents felt it would be "very important" for them to have information about the potential risks or negative effects of biotechnology. Most others said such information would be somewhat important. Just under two-thirds said it would be very important to have information about new uses of biotechnology in human health care. Half of all those who were asked this set of questions indicated that it would be very important to have more information about the potential benefits or positive effects of biotechnology. Under half felt information about new uses of biotechnology in food production would be very important. Almost as many felt that information about how government regulates biotechnology would be very important. The information considered least important involved the basic science behind biotechnology. However, even in this case over one third said this information would be very important and over half said it would be somewhat important.

The survey also determined the extent to which respondents will trust information they receive from various sources. Respondents were asked the following question about each of nine different information sources: "Suppose that a number of groups made public statements about the benefits and risks of biotechnology products. Would you have a lot of trust, some trust, or no trust in statements made by (Name of each information source was read)?" Responses are shown in Figure 6.

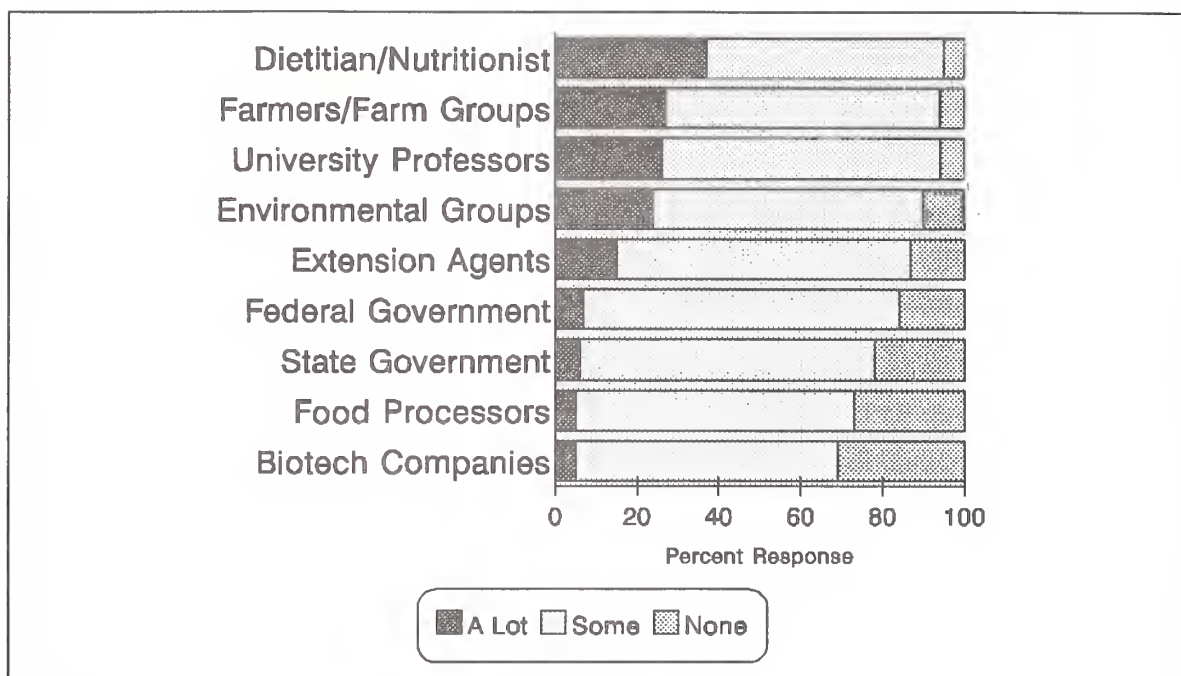


Figure 6. Percentage of respondents that expressed various levels of trust in sources of information about biotechnology

Dietitians and nutritionists were viewed as the most credible source of information about biotechnology. Three other sources appear also to have a fairly high level of credibility. Around one quarter of all respondents would have a lot of trust in: farmers and farm groups, university professors, and environmental groups. Results changed somewhat when asked about County Extension Agents. In this case, 15 percent of all respondents said they would have a lot of trust and most others said they would have some trust in statements from Extension agents.

Four sources of information received lower ratings of trust from the respondents. Only seven percent would have a lot of trust in federal government agencies. Almost three quarters would have some trust; but 16 percent said they would have no trust in federal government agencies. The situation is similar for state government agencies, except that in this case over one fifth of all respondents said they would not have any trust. Over one fourth of the respondents said they would have no trust in statements made by the other two sources: food processors and manufacturers and companies making biotechnology products.

It seemed important to obtain a general assessment of respondents' bottom-line reactions to use of biotechnology. This was done by the following question: "Overall, would you say you support or oppose the use of biotechnology in agriculture and food

production?" Almost two thirds of all respondents (64 percent) said they supported the use of biotechnology in agriculture and food production. Just over a quarter (27 percent) opposed the use of biotechnology. Almost 10 percent did not have an opinion on the question.

Some additional analysis revealed the types of respondents who were likely to express support for the use of biotechnology in agriculture and food production. Men were more likely to support the use of biotechnology in agriculture and food production than women. Respondents with higher educational and income levels also expressed greater support for biotechnology. People who believed religion was more important tended to express greater opposition to the use of biotechnology. Interest in and information about new scientific and technological developments had a positive influence on support for the use of biotechnology.

Those who had read or heard more about biotechnology, as well as respondents with a greater interest in learning about biotechnology, expressed greater support. Respondents who felt biotechnology was morally wrong were much more likely to oppose its use. High levels of confidence in government, as well as trust in information, had a significant positive relationship to support for biotechnology.

Conclusions and Implications

Most people appear fairly positive about the general concept of biotechnology. They recognize and appreciate some of the potential applications and benefits from biotechnology. However, certain applications of biotechnology in agriculture and food production may prove to be relatively unacceptable to consumers. Acceptance of plant products will likely be much higher than applications of biotechnology in livestock production or food processing.

Results show that the source of genetic material being used will be relevant for consumers. People may believe that transferring genes between different organisms involves more than the simple movement of the DNA that carries a specific characteristic. Environmental and ethical concerns could prove very important for many people. To some extent, such concerns may reflect misunderstanding about biotechnology. However, the high potential for moral objection to biotechnology suggests that the issues may increasingly be framed in terms of basic values and fundamental beliefs.

The survey indicates a fairly low level of confidence in government agencies to effectively regulate biotechnology. What is not clear, however, is whether respondents understand the nature of government policies and regulations in this area. Low confidence was also reflected in the fact that almost all respondents felt that government should pay more attention to what people like themselves think about biotechnol-

ogy. Confidence in government regulations and public policies is important for acceptance of biotechnology as safe and effective. Increased education and public involvement will be necessary for building consumer confidence.

Survey results suggest that consumers' acceptance of food produced through biotechnology could be substantially enhanced through university-based educational programs aimed at explaining biotechnology in ways that consumers can understand. Respondents expressed interest in a wide range of information about biotechnology. The goal of education should be to help consumers make choices about biotechnology based on sound information. Such information must go beyond technical information or even the benefits of certain applications. This will require an extensive educational effort about food production, biology, risk management, and public policy. Consumers need more information about public oversight of biotechnology.

Education about the use of biotechnology in agriculture and food production is part of a much larger educational need. Today, most American consumers take their food supply for granted until they perceive a problem. As technology has become more complex, consumers have become increasingly apprehensive about the safety of their food. It will be important to put biotechnology in a historical and technical context relative to other types of food production technologies. For example, the survey indicated limited understanding of traditional agricultural practices such as cross-breeding. The survey also indicates the need to more clearly differentiate the use of biotechnology from the use of pesticides and other chemical technologies. Some confusion seems to exist along these lines.

Further work is needed to gain a better understanding and appreciation of consumer attitudes about biotechnology. Public opinion and knowledge can change rapidly in response to a variety of social and technical developments. This survey provides a starting point for an expanded dialogue about this complex and important area. It seems in everyone's interest to ensure that decisions are made on the basis of sound information rather than emotion.

At the time of the survey, consumers appeared cautiously optimistic about the use of biotechnology in agriculture and food production. However, it also appears that consumer acceptance of food produced through biotechnology could be limited by one or more of the following factors: insufficient knowledge; lack of confidence in government; perceived exclusion from decision making processes; moral objections to tampering with nature; and perceived environmental and food safety concerns.

It will also be important to realize that all products of biotechnology will not be evaluated equally. Acceptance of biotechnology appears to vary depending on the nature of the application, including the perceived benefits and risks of each. Scientists

and decision makers should more carefully consider consumer response to different applications prior to the development and introduction of products into the market.

The future of biotechnology in food production is by no means assured without a much more ambitious and open educational process. Science-based educational programs may not, however, be very effective or even appropriate when attitudes are based on fundamental moral beliefs or values. The impact of education may also be limited by lack of confidence in government or distrust of information sources. Citizens want and deserve to become more involved in decisions about important areas such as biotechnology. They also want assurance that government agencies and others will protect their interests.

Such a commitment to biotechnology education represents a challenging task. However, lack of a concerted effort to educate consumers could result in low consumer acceptance of products. Limited acceptance would not only be costly for the government agencies and private companies who have sponsored the research; but also entail significant opportunity costs for society in terms of a failure to achieve the environmental and health benefits associated with biotechnology.

Acknowledgements

This work would not have been possible without the advice and assistance of many people and organizations. I especially acknowledge Dr. Patricia Kendall, Extension Food Science Specialist at Colorado State University, who was co-investigator on this project. Funding was provided by Extension Service-USDA, North Carolina State University, and Colorado State University. The conclusions in this paper are those of the author and do not necessarily reflect those of the funding organizations or the many colleagues who helped with this project.

Outlook '93

For Release: December 2, 1992

ANIMAL BIOTECHNOLOGY ON THE HORIZON

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Animal biotechnology, the application of the findings of biological research to animals, has been with us in a very practical way for most of this century for farm animals. The use of artificial insemination was the first animal biotechnology to have a major impact in this century. That impact became tremendous for dairy cows and pigs after the ability to freeze semen was developed. More recently, the biotechnologies of embryo cryopreservation and transfer have resulted in the worldwide rapid dissemination of extremely valuable genetic stocks. In the past few years, commercial ventures have been started based on the biotechnology of cloning animals. Cloning, in this context, means the production of multiple identical animals each derived from a single embryonic cell. These technologies will have impact for many years as plans are made to preserve as many species as possible to protect the genetic resources of the world.

The animal biotechnology that I will focus on today results from the revolution in molecular biology that permits us to permanently or temporarily modify the genetic composition of animals. Permanent modification means inserting genes into animals in such a way that the new genes can be passed on to their offspring. These animals with permanent genetic modification are called "transgenic" (Gordon and Ruddle, 1981). Temporary modification means that only the treated animal sees the new genetic material and perhaps only for a short time. Such animals I will call "somatogenic", indicating that only somatic cells, not germ cells, are modified.

The production of transgenic animals, while inefficient, is straightforward from the biologist's point of view. One-cell embryos are collected from donors shortly after insemination, and DNA solution containing the genes of interest is injected into a nuclear structure in the embryo. Embryos are either immediately transferred to recipients or cultured until they develop to a transferrable stage, e.g., the blastocyst stage in cattle. Only a small percentage, about one-half of 1% of injected eggs, results in the production of a transgenic farm animals (Rexroad, 1992).

The molecular biologist's view of this process is perhaps more complex and is beyond the scope of this talk. However, the power of transgenic technology is based on the molecular biologist's ability to modify and rearrange DNA molecules, thus creating genes with unique properties not found in nature (see Fig. 1 for an example). Another example is the ability to combine the part of one gene that serves as a mammary gland genetic switch with the part of another gene that specifies the production of some desired protein. Such new genes are being used to produce valuable protein pharmaceuticals such as human α -1 antitrypsin (Wright et al., 1991) in the milk of transgenic farm animals.

The production of somatogenic animals is also simple in concept. Two basic approaches are possible and will be only briefly considered because research in this area is limited for farm animals. The first approach is similar to that proposed for gene therapy in humans in which cells are removed from an animal and treated with DNA containing the genes to be expressed. The cells are returned to the animal. The animals will have the ability to produce the gene product as long as the cells persist. This complex procedure is probably not on the horizon for farm animals unless "universal donor" cell lines that can be given to any animal can be produced.

The second approach is elegant in simplicity. The DNA containing the gene of interest is injected by a pneumatic injector into the tissue in which it is desired to have the gene product produced. This "gene gun" is of the type used in the past for mass immunizations in the military. Gene gun therapy may have merit for inducing immunity in animals by introducing the gene for an antigen rather than the antigen. This approach might reduce problems associated with reactions to antigens other than the one of choice that result from the production of vaccines in culture. In addition, this approach might enhance our ability to produce multivalent vaccines for disease organisms that mutate frequently. Another possible use is simply to produce the gene product, such as a valuable pharmaceutical, in the injected tissue. While gene gun somatogenics may be on the distant horizon, Dr. Robert Wall in my laboratory in collaboration with a group from the NIH have demonstrated gene expression resulting from the injection of DNA into the mammary gland of sheep (Furth et al., 1992).

Three goals readily discernable for the use of genetically modified animals in agriculture are improvement of production characteristics, of animal health, and of product quality. I will provide brief examples of current research to demonstrate how genetic modification of animals might lead to achieving goals of each type.

The first transgenic animals reported in the scientific literature were produced at Beltsville (Hammer et al., 1985). These transgenic animals were genetically modified by the incorporation of additional growth hormone genes that produced growth hormone in many tissues. This widespread production caused increased levels of growth hormone in the blood of pigs and sheep. The important result of this research was the demonstration that permanent genetic modification could be made to farm animals. Subsequent important findings are that the growth hormone transgenic pigs grew faster (Fig. 2A), used feed more efficiently (Fig. 2B), and were very lean (Fig. 2C) (Pursel et al., 1989; Solomon and Pursel, 1992). Utilization of these findings awaits better understanding of the control

of the inserted genes to prevent detrimental effects associated with overproduction of growth hormone, such as reduced libido and leg problems (Pursel et al., 1987, 1989). Another genetic modification of pigs has been the insertion of a gene called SKI that very specifically enhanced muscle growth in mice. In swine, SKI causes variable phenotypes that are still under evaluation (Pursel, personal communication). These studies have demonstrated that the fundamental knowledge of growth is not sufficient to permit controlled manipulation. Intensive studies on the genetic regulation of muscle development and on regulation of genes suggest that we may profitably genetically modify animals for improved growth in 10 to 15 years.

Genetic modification of animals for improved health offers a great deal of promise because of the resources directed to understanding mechanisms of infection and host resistance. Experiments in nature in which mice secreting a retroviral-like protein are resistant to viral infection demonstrate one potential method for genetically modifying animals for resistance to viral infection. Chickens made transgenic by retroviral infection of the embryonic egg developed resistance to further infection when an incomplete retrovirus incorporated into their genome (for review, see Crittenden and Salter, 1990).

Retroviral infection of cells is thought to proceed by the attachment of specific viral coat protein to a specific cell protein, a receptor, on the surface of susceptible cells. Attachment may be a weak link in the infection process (see Fig. 3).

At Beltsville in cooperation with Bill Narayan and Janice Clements of Johns Hopkins University, we have genetically modified sheep with retroviral DNA that produces the attaching retroviral coat protein in susceptible cells. Our prediction was that we would flood the cell surface receptor and prevent retroviruses from attaching to the cells and being taken up to start the process of infection. These genetically modified sheep are potentially valuable resources for understanding retroviral infection mechanisms and understanding other processes of concern in the genetic modification of animals. Investigations are underway to determine if these transgenic sheep are likely to be protected against retroviral infection.

The horizon for the genetic modification of animals for increased disease resistance is not clear. Incorporation of transgenes into production cattle would take 15 years if a genetically modified cow with desirable traits were available today. Most of the time would be consumed in breeding the gene into the production population and testing each generation for the persistence of the trait in a new background. The time lines for introduction into swine or sheep would be much shorter because of the shorter generation intervals. Nonetheless, genetically modified animals with enhanced disease resistance as a permanent trait seems to be at least 10 to 15 years in the future. The horizon could be much closer for those genetic modifications schemes that need only to produce somatogenic rather than transgenic animals. Thus, if only antibody production rather than specific cell production of a protein is needed, then animals could be injected by a "gene gun" with DNA coding for an appropriate antigen. This technology could be valuable in the 5 to 10 year range.

The goal for genetic modification of animals that is closest to fruition is alteration of product composition. The driving force for product quality research has been the prediction that proteins with pharmaceutical value could be produced correctly and in large quantities in one of nature's best bioreactors, the mammary gland. An example of this research is the production of the pharmaceutical α -1 antitrypsin in the mammary gland of sheep (Wright et al., 1991). α -1 antitrypsin deficiency results in susceptibility to emphysema. Transgenic sheep produced in a government-industry collaboration in Edinburgh, Scotland, produced α -1 antitrypsin as 2 to 50% of their milk protein. The transgenically produced material was bioactive. The bioactivity of the material indicated that the mammary gland is capable of correctly processing proteins normally produced elsewhere in the body. The value of the technology can be quantified because it was sold for an estimated \$25,000,000. Pharmaceutical research will impact agriculture in several ways. Some small population of milk animals will be diverted from food production to pharmaceutical production, perhaps as much as 5% of the U.S. dairy herd in the next 20 to 30 years.

Research on pharmaceutical production in milk will make it possible to conceive of experiments to modify milk in other ways to improve cheese production, reduce fat concentration, and reduce mastitis susceptibility (Wilmot et al., 1990). Other modifications may make cow's milk more like human breast milk. The horizon for food products from genetically modified animals is not clear and will depend on both continued research and the regulatory environment for products from genetically modified animals. The potential for modifying the composition of meat and eggs is under consideration but progress is such that predictions cannot yet be made.

Genetic modification of farm animals is in its infancy. The growth and development of the field is in part sustained by biomedical interest in transgenics. The usefulness of genetically modified animals is dependent on better understanding of the genes that regulate growth and development and on better understanding of how to regulate genes that are inserted into animals. Continued research on genetic modification of animals depends on the scientific community transmitting to the consumer that this research has tremendous potential to safely improve the quality of products consumed and at the same time offers the opportunity to improve animal health and productivity.

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Figure 1. New Genes By Recombination

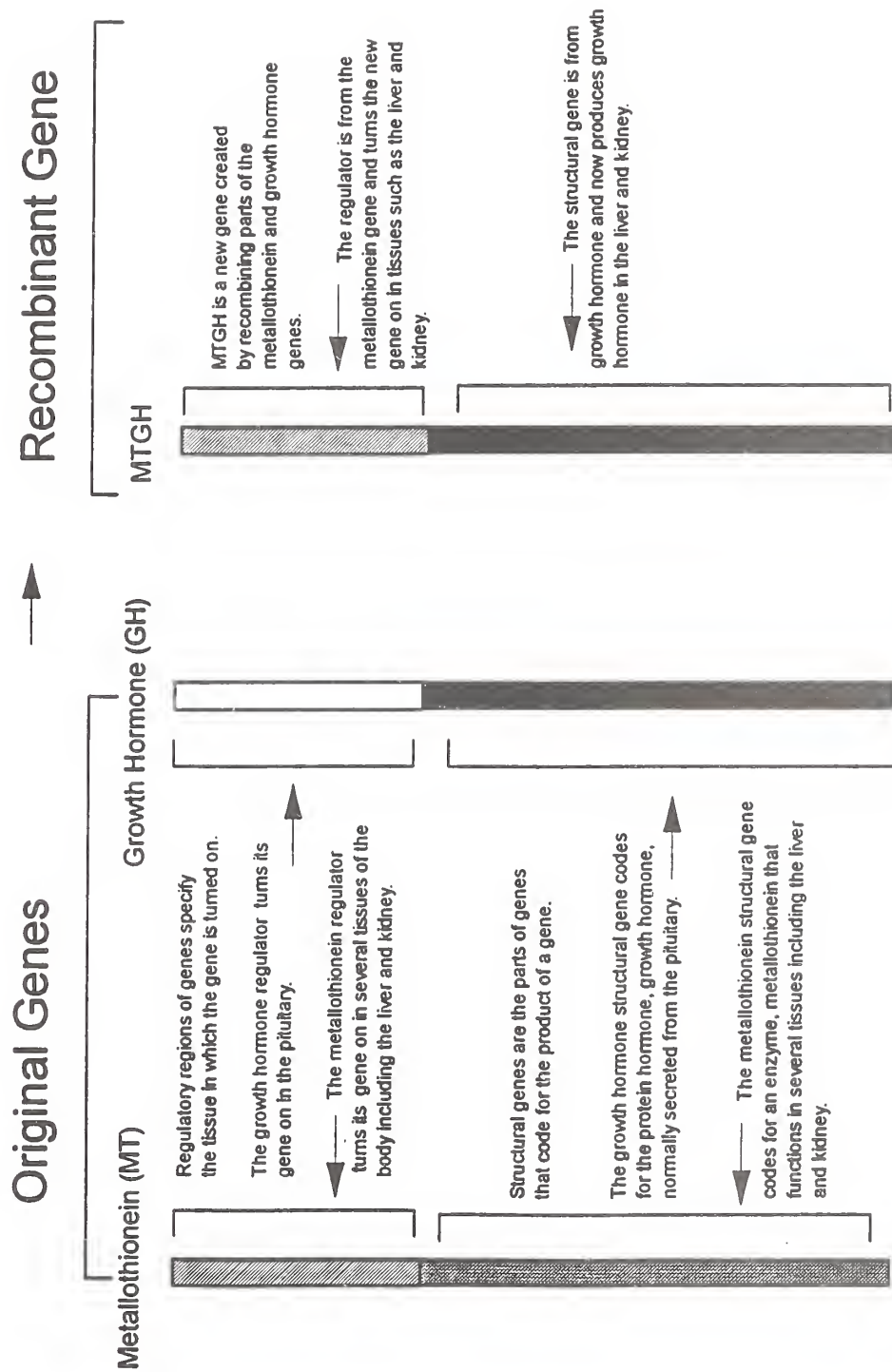


Figure 2. Growth performance Of Transgenic Pigs

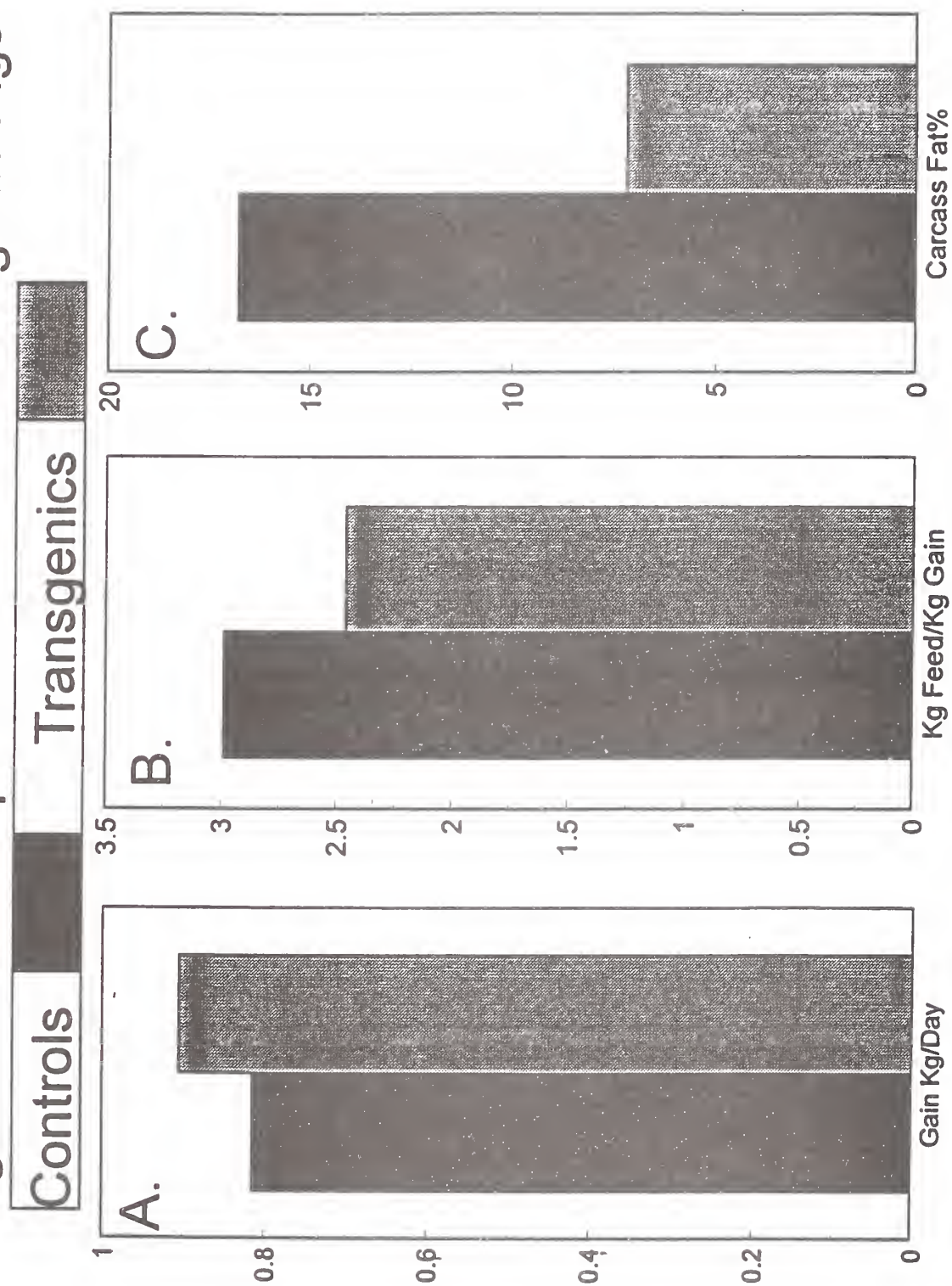
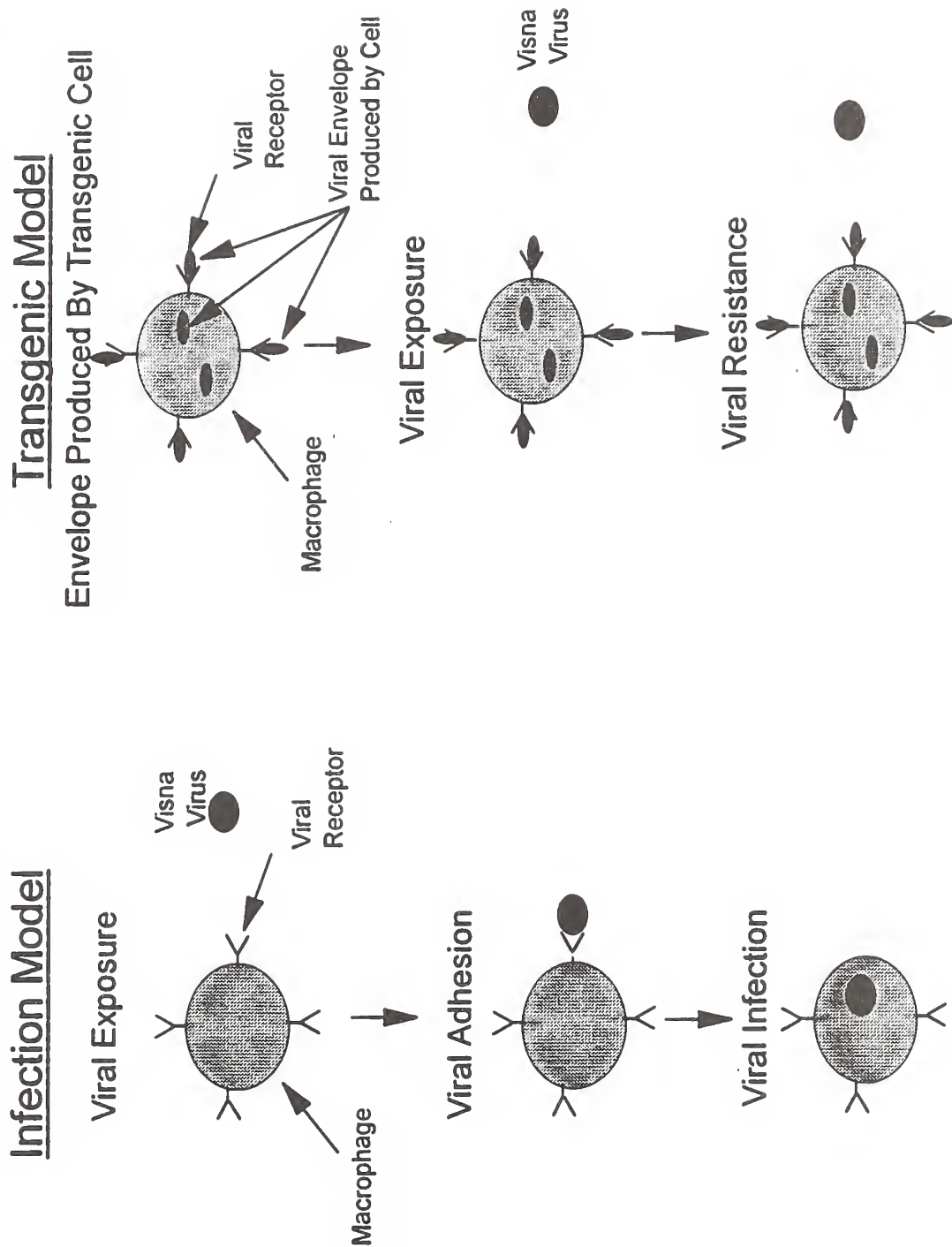


Figure 3. Model For Blocking Retroviral Infection



Outlook '93

For Release: Wednesday, December 2, 1992

FOOD EXPENDITURE PROJECTIONS: 1990-2010**Noel Blisard
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In 1991 the U.S. food marketing system contributed approximately 9.5 percent of the gross national product after purchasing approximately \$109 billion of agriculture commodities from the farm sector. About \$286 billion was spent in retail food stores while another \$251 billion was spent in food service establishments. However, sales in current dollars declined by about 0.5 percent from 1990 to 1991. Slower sales relative to the 1980's in both at-home and away-from-home food expenditures are expected to continue throughout the 1990's and into the next century. Demographic trends often cited as reasons for this include a slower growing population, changing age distribution, regional migration, increased longevity, and altered employment patterns.

Long term survival for both production and marketing firms will depend in no small part on an understanding of how these demographic trends will impact the demand for food. Two of the most important demographic changes which will affect food demand are the slowing of the overall population growth rate and the subsequent aging of the population. For example, from 1970 to 1990 the U.S. population increased from 204.0 million to approximately 249.9 million, which is an annualized growth rate of 1.00 percent. However, from 1990 to 2010 the population is projected to grow to approximately 282.1 million. This represents an annualized growth rate of 0.6 percent, or just over half the growth rate of the 1970-90 period. Hence, firms will not be able to rely on population growth to fuel expansion in terms of output and profits.

The decrease in the growth rate of the U.S. population and increased longevity will result in changes in the age distribution. For example, in 1985 approximately 47.5 percent of the population was under 30 years of age. However, this figure is expected to decline to approximately 41 percent by the year

2000, and to approximately 39 percent by the year 2010. Likewise, in 1985 persons 45 years old and over accounted for just 31 percent of total U.S. population. By the year 2010 this group is expected to represent 41 percent of population

These demographic changes along with regional population shifts, and anticipated growth in consumer income have implications for food consumption. In addition, since many agricultural subsectors are almost entirely dependent on the U.S. domestic market, future resource adjustments within many agricultural subsectors are likely to be closely linked to changes in the domestic demand for specific goods.

Before presenting some of our analysis relating to demographic and socioeconomic factors in demand, it is appropriate to mention two limitations when such analysis is used for projection purposes. First, there is an implicit assumption that as an individual moves from one group to another his or her preferences immediately take on the characteristics of the "new" group, regardless of his or her previous identify. Second, the analysis is based on cross section data collected over a short period of time and it is usually assumed that prices are constant across groups. Thus, the observed purchase behavior is for a fixed set of food and non-food prices. No one can be sure that the same consumption patterns would exist under alternative relative price observations.

Given this background, the remainder of the paper will be devoted to presenting some results from a recent study of food consumption by demographic groups using data from the Bureau of Labor Statistic's Continuing Consumer Expenditure Survey for 1988 and 1989. The presentation will be organized as follows: (1) identification of important socioeconomic and demographic groups; (2) expenditure patterns for the groups expected to experience the most dynamic changes; (3) implications for future food demand; and (4) implications for production agriculture.

Consumption Patterns By Demographic and Socioeconomic Group

With respect to implications for food consumption, income and population growth will have a large impact. However, the following demographic and socioeconomic changes will also effect the demand for food to some extent:

1. The slowing of the overall population growth rate with the projected growth over the next 20 years (13 percent) just slightly more than half the growth rate between 1970 and 1990 (22 percent).
2. Changes in the age distribution toward an older population.

3. Changing geographic distributions suggesting that the Northeast and North Central regions will experience declines in their share of the total population while the South and West will gain population share over the next 20 years.
4. Changing racial mix with blacks becoming a larger share of the total. Blacks currently represent about 12.6 percent of the population and are expected to account for slightly more than 14 percent in 2010.

Table 1. Simulated Impact of Regional Location on Per Person Food Expenditures: Selected Foods

Item	Northeast	North Central	South	West
Percent of base <u>a/</u>				
All Food	103.0	95.5	99.0	103.3
Food Away From Home	99.0	98.4	103.0	99.2
Food At Home	105.3	94.7	95.5	106.2
Beef	103.6	96.4	98.8	102.4
Pork	101.0	104.4	105.9	91.2
Poultry	126.0	84.4	102.6	96.1
Dairy Products	105.2	94.3	94.3	107.9
Fruits	109.1	93.5	90.9	109.1
Vegetables	103.3	90.1	97.4	110.5
Fats and Oils	96.4	96.4	96.4	105.5

a/ Percent of overall sample means, holding all variables constant at mean levels including the region of interest, but excluding the other three regions.

Source [1]

Tables 1, 2, and 3 contain summarized results of statistical analysis of the 1988-89 BLS Continuing Consumer Expenditure Survey designed to determine the net effect on food expenditures due to changes in certain demographic variables. The results are reported in percentages relative to a "base" number as defined in a footnote to each table. In each case, all explanatory variables, except those of interest, are held constant at their mean values. Thus, the analysis is an attempt to measure the marginal impact of certain factors, holding all other factors constant.

Table 2. Simulated Impact of Age on Per Person Food Expenditures: Selected Foods

Item	Age Group		
	20-29	30-44	65-74
Percent of base <u>a/</u>			
All Food	93.1	98.0	98.1
Food Away From Home	135.9	119.7	87.2
Food At Home	69.9	85.1	104.6
Beef	65.7	79.3	95.3
Pork	56.3	78.5	108.1
Poultry	67.0	85.7	111.0
Dairy Products	81.5	92.8	104.8
Fruits	61.0	76.1	122.5
Vegetables	60.2	79.6	111.0
Fats and Oils	58.0	72.5	108.7

a/ Percent of average expenditures by 45 to 64 year old, holding all other variables constant at their mean level.

Source [1]

Regional impacts on food expenditures are presented in Table 1. When adjusted for other socioeconomic and demographic variables, regional differences in consumption expenditures for aggregate food groups tend to be small. The most variation appears in the poultry group with expenditures in the Northeast averaging 26 percent above the base average and North Central expenditures averaging 15 percent below the base. Expenditures on food-at-home were 5 and 6 percent higher in the Northeast and West respectively, but approximately 5 percent lower for the North Central and South.

Some regional variation in food expenditures may represent regional differences in average prices over the 1988-89 data collection period. Regional differences might be more important in determining how food is prepared and consumed than in determining the absolute consumption level.

Table 3. Simulated Impact of Race on Per Person Food Expenditures: Selected Foods

Item	Nonblack	Black
Percent of base <u>a/</u>		
All Food	101.6	89.7
Food Away From Home	102.9	82.8
Food At Home	101.0	93.4
Beef	100.0	101.8
Pork	96.1	116.7
Poultry	96.1	129.0
Dairy Products	103.9	76.0
Fruits	100.0	98.9
Vegetables	100.0	98.7
Fats and Oils	101.8	80.0

a/ Percent of overall sample means, holding all other variables constant including the appropriate race variable but excluding the other.

Source [1]

Table 2 focuses on estimates of how average per capita food expenditures change as the consumer ages, holding all other factors constant. The results are expressed as percentages of average expenditures for the 45 to 64 year old "base" group. Food-away-from-home expenditures are 20 to 36 percent higher for persons between age 20 and 44 than they are for persons between age 45 and 64. On the other hand, food-at-home expenditures are 15 to 30 percent lower for the 20 to 44 age group as opposed to those 45 to 64. Because of this, the at-home expenditures for all the major food groups are less for the 20 to 44 age group than for those 45 and over. Food-at-home, pork, poultry, dairy, vegetables, and fats and oils tend to peak with the 65 to 74 year old group.

Table 3 indicates that, other factors equal, nonblack households spend more per person than their black counterparts for most food groups. Black households' average total food expenditures are estimated to be over 10 percent below the average for all families of similar characteristics. Across food groups, the results imply that blacks and nonblacks allocate their food dollar in substantially different ways.

Nonblacks' per capita expenditures for dairy products average nearly 28 percent above the per capita expenditures by blacks. However, blacks tend to spend more for beef, pork, and poultry. In fact the results suggest that per capita expenditures for poultry are nearly 34 percentage points higher for blacks than nonblacks.

Projections

There is much interest in the implications of changing demographic and socioeconomic characteristics on long-term food demand patterns. An analysis of demographic differences in food demand was combined with projections of changes in age distribution, regional shifts, racial mix, income growth, and total population growth to obtain estimates of the impact on future expenditure patterns. It is beyond the scope of this speech to detail all of the assumptions underlying the projections for changes in the demographic characteristics over the next 20 years. Additional specific assumptions are detailed in [1].

Results summarized here are from projections based on the following major assumptions:

- a. The U.S. population will grow from 249.9 million in 1990 to 282.1 million in 2010. This is the Bureau of the Census Middle Series projection. [2].
- b. Blacks will increase from 12.6 percent of the total

population in 1990 to 14.1 percent in 2010.

- c. The regional population distribution, expressed as shares of the total U.S. population will change as follows [1]:

Year	Northeast	North Central	South	West
----- Percent -----				
1990	20.3	24.1	34.6	20.9
2010	19.1	21.2	36.7	23.1

- d. The age distribution, expressed as a percent of the total population will change as follows [2]:

Age Group	1990	2010
----- Percent -----		
0-9	14.5	12.5
10-19	14.0	13.0
20-29	16.2	13.8
30-44	24.2	19.2
45-64	18.8	27.5
Over 65	12.8	13.9

The demographic determinants of demand considered in the projections are race (black/nonblack), age distribution, geographic distribution, and size of the population. Projections are made under the assumption that real per capita income will grow at 2 percent per year. Although commodity prices and consumer tastes and preferences are known to be important factors influencing food consumption over time, economists generally have little knowledge about the future course of these factors. For purposes of this study, relative prices and consumer tastes and preferences within the defined categories are assumed to remain stable at levels existing during the 1988-89 period.

Table 4 contains the projected changes in per capita consumption between 1990 and 2010 due to projected changes in demographic characteristics and to assumed income growth. Columns 1 through 4 contain the estimated impacts of changes in individual factors, assuming all other variables are unchanged. The last column, labeled "Total", contains the net estimated change after accounting for the projected adjustments in all variables.

Of the three demographic characteristics (age, regional distribution, and race), changes in age distribution are likely to have the biggest impact on per person demand. Age distribution changes are projected to increase per capita food expenditures by 1.0 percent over the 20 year period. Regional population distribution changes are expected to have a slight positive effect on total food expenditure and changing racial mix will have an expected slight negative impact.

Table 4. Estimated Percentage Change in Food Expenditures, 1990-2010.

----- Effect Due to: -----					
Food Group	Age Distribution	Regional Distribution	Race	Income	Total _{a/}
	----- percent -----				
All Food	1.0	0.1	-0.2	14.9	16.1
Beef	3.7	0.1	0.1	3.5	7.5
Pork	4.1	-0.3	0.3	1.3	6.2
Poultry	2.7	0.1	0.7	5.3	9.6
Cereals & Bakery	2.6	0.0	-0.2	4.7	7.3
Dairy Products	1.5	0.1	-0.4	4.7	6.0
Fruits	3.7	0.1	-0.1	10.5	14.8
Vegetables	4.3	0.5	-0.1	6.1	11.1
Sugars & Sweeteners	2.4	0.3	-0.1	6.2	8.8
Fats & Oils	4.2	0.2	-0.2	4.6	8.9

a/ Net adjustment after accounting for projected changes in all variables.

Source: [1]

The change in age distribution has the most impact on vegetables (up 4.3 percent), fats and oils (up 4.2 percent) and pork (up 4.1 percent). The least impact is expected for dairy products (up 1.5 percent) and sugar and sweeteners (up 2.4 percent). Age

distribution changes are expected to be a positive force for per capita expenditures of all major food groups.

As indicated by the result for total food, per capita expenditures for the identified food groups are expected to be influenced little by changes in the regional population distribution. Pork would experience a slight decline while the other groups would experience a slight increase. The basic conclusion is that regional distribution changes will have a negligible impact on the demand for food.

While racial distribution changes will generally have a negative impact on per capita expenditures, poultry, pork, and beef will have slight increase whereas the other food groups would have slight decreases.

Far overshadowing the implications of changes in demographic characteristics are the projected changes in per capita food expenditures due to income growth. If we assume an average 2 percent per year growth rate for per capita real income, total per person food expenditures are projected to increase almost 15 percent over the 20 year period. Much of the total income response occurs in food-away-from-home expenditures which are estimated to grow about 24 percent (not shown in table).

Income growth benefits fruits (up 10.5 percent), sugars and sweeteners (up 6.2 percent) and vegetables (up 6.1 percent) the most. Beef and pork will benefit the least (up 3.5 and 1.3 percent respectively).

The scope of this presentation prohibits going into much detail concerning the projections. However, it is appropriate to note that these projections are for per capita expenditures, assuming fixed relative prices. As supply and demand conditions change over time, relative prices have to change and the expenditure patterns suggested here could be altered dramatically. Also, these results implicitly reflect changes in the quality and product mix of purchases. For example, the income-generated growth in dairy product expenditures reflects high growth in other processed dairy products (up 12 percent) and cheese (up 9 percent) and offsets a decline in milk and cream products (down 2 percent).

The net effect of projected changes in demographics and an assumed 2 percent real income growth is given in column 5 of table 4. Overall, per capita food expenditures are expected to grow 16.1 percent. The largest increases are anticipated for fruits (up 14.8 percent), vegetables (up 11.1 percent) and fats and oils (up 8.9 percent). Dairy products have the lowest growth with just a 6 percent increase. Likewise pork expenditures are expected to grow just 6.2 percent over the 20 year period.

So far we have discussed the outlook implications of demographic change and economic growth on per capita food expenditures. Another very important factor driving growth in food demand is the expansion of the total population. As indicated earlier, the Bureau of the Census middle series projections suggest that nearly 32 million additional people will have to be fed in the year 2010 compared to 1990. Table 5 contains estimates of the percentage changes in total national food demand between 1990 and 2010, after accounting for projected per capita expenditure changes and changes in the total population.

Table 5. Estimated Percentage Change in National Food Expenditures, 1990-2010.

Food Group	Percent Change ^{a/}
All Food	31.1
Away From Home	37.4
At Home	24.2
Beef	21.4
Pork	19.9
Poultry	23.7
Cereals and Bakery	21.1
Dairy Products	19.7
Fruits	29.6
Vegetables	25.4
Sugars and Sweeteners	22.8
Fats and Oils	22.9

^{a/} Assumes 2 percent annual income growth, demographic changes, and Bureau of the Census population growth projections.

Source: [1]

Total food expenditures are projected to increase 31.1 percent. Food-away-from-home expenditures increase 37.4 percent compared to 24.2 percent for food-at-home expenditures. Recall that these projections are made under the assumption of constant real prices; hence the estimates for individual food categories represent a "rough" estimate of volume changes. Note also that the individual food groups represent at-home consumption only. To the extent that the away-from-home market grows for particular foods, these projections will understate total expenditure growth for the individual food groups.

Population growth is a dominant factor affecting future food

expenditures. One effect of the slow but steady growth of the population is that the variation of growth levels between food groups as indicated in table 5 is less than that exhibited by the per capita projections in table 4. The largest projected increase is for fruits (up 29.6 percent) while the smallest is for dairy (up 19.9 percent).

Implications For Agriculture

While it is beyond the scope of this speech to detail all the implications for agriculture, some general observations relative to agricultural resource use are appropriate. Between 1955-59 and 1979-83, yields for major crops increased as follows: corn (110 percent), wheat (58 percent), sorghum (94.5 percent), and soybeans (29.5 percent). Focusing on the period from 1980 to 1987, the amount of acreage in total agricultural production decreased 4 percent while total agricultural production increased approximately 20 percent. If we assume trend growth rates in average production will continue, it is obvious that the projected demand increases for food will not require net additional acres of land and other inputs for feed and food production. Indeed, agricultural resources will be shifted to other areas of the economy, or we will have to experience substantial growth in foreign demand to maintain constant real prices.

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Outlook '93

For Release: Wednesday, December 2, 1992

THE OUTLOOK FOR FOOD PRICES IN '93 AND BEYOND

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Food Price Inflation in 1992, is the Lowest in 25 Years.

The Consumer Price Index (CPI) for food this year has increased only slightly more than 1.0 percent above last year. The CPI for food purchased away from home rose a little over 2.0 percent. The CPI for food at home (food purchased in grocery stores) rose only about 0.6 percent. In terms of the CPI for food at home, this is the smallest increase since 1967 when the index declined 0.3 percent. For food away from home, it is the smallest increase since 1965.

Today I want to discuss the dramatic slowdown in food price inflation in the past two years and then turn to what we might expect for next year and beyond.

First, let me review the three basic factors which determine food price changes. These are; changes in the farm value of foods, changes in the costs of processing and distributing food, and changes in consumer demand.

The farm value of food varies as farm prices change, typically in response to available market supplies. Fluctuations in market supplies result from planned and unplanned changes in production. Farmers increase or decrease production based on input costs and expected returns. Unplanned production changes can come from weather, disease, or insect infestations. The farm value concept refers to the cost of raw farm ingredients used in a finished consumer food. The effect of changes in the farm value of food on retail price depends on what proportion the farm value is of the retail cost. That share can vary from less than 10 percent to 60 percent of the retail price, depending on the product. On average, the farm value share of the retail dollar fluctuates around 30 percent.

The costs of processing and distributing foods are those costs incurred beyond the farm gate. They include costs for labor, packaging, energy, transportation, and other related inputs. On average, these costs account for about 70 percent of the retail food dollar. The proportion of the retail food dollar going to processing and distribution has increased over time as more and more services and convenience have been incorporated in food

products. Increased in-store services such as bakeries, delis and salad bars as well as microwavable heat-and-serve products are only a few examples. Changes in the costs of these inputs are closely related to events occurring in the general economy, particularly factors which influence the general rate of inflation.

Consumer demand is the third factor affecting food prices. Some of the elements of consumer demand for food are: consumer tastes and preferences, the price of the food, the prices of alternative foods, prices of other goods and services, and disposable personal income. I would like to spend a few moments talking about these elements because they are important in analyzing the food price outlook through the recovery from our current sluggish economic situation.

Consumer tastes and preferences are not likely to change significantly from one year to the next. Changes in tastes and preferences normally take several years to show a trend and are generally driven by changes in socio economic and demographic characteristics. No doubt, concerns about health and nutrition will have recognizable effects on per capita disappearance of individual food commodities. Also, a food analyst must be aware of "food fads" which can effect consumer food demand in a shorter time period.

Changes in the levels of disposable income are an important element affecting total consumer demand for food. Disposable income determines consumer budgets and the resulting constraints on expenditures. When the general economy is growing, income will generally increase as well. Increases in per capita income increase total per capita food expenditures and increase per capita consumption of most commodities. Through most of the 1980's, sustained economic growth brought about increases in real disposable personal income. This means increased take home pay over and above the rate of inflation. It also means increased consumer demand for all goods and services. In contrast, during a recession, when disposable personal income falls so does consumer demand.

How changes in prices affect consumer demand is easier to understand having described income and budget constraints. When the price of a food item on a consumer's shopping list increases and income does not, something has to give. Consumers will look for lower priced substitutes or perhaps not purchase anything in that food category. The price rise in this case has the same effect as a decline in income in that the consumer can no longer enjoy as high a standard as before. Within year and between year changes in food prices are usually caused by supply fluctuations, but changes in demand can also affect prices.

How have the factors which affect food prices behaved in 1992?

This year the farm value of food declined about 2.4 percent after a 6.3 percent decline in 1991. The costs of processing and distribution increased only about 2.0 percent after nearly 7 percent the year before. The decline in farm value can be attributed to larger production and lower market prices for a number of farm products. Costs of processing and distributing food rose only slightly because of the low rate of inflation.

Real disposable personal income declined 1.3 percent in 1991, and it has not grown enough this year to offset that decline. This means that consumers have had to cut back on spending where ever possible. Consumers cannot cut back on fixed budget items such as rent or mortgage payments, but they can and will cut food expenditures. The grocery store is one of the places consumers cut spending. The grocery trade calls this "buying down". Consumers have been buying fewer ready prepared foods such as microwavable entrees, TV dinners, and other highly prepared foods. Instead, they have been buying more basic ingredients to prepare at home from scratch.

Total expenditures for food away from home during the first 10 months of 1992 increased 2.2 percent above the same period a year ago, which matches the change in the CPI for food away from home in the same time period. Since expenditures are the product of price times quantity and the CPI represents the change in price, there is an implication that the quantity or volume of food and services sold in restaurants and other eating places has not changed.

CPI Changes in 1992 and expectations for 1993

I would like to start with the CPI changes for the food categories whose prices have declined in 1992. While much of the discussion will describe supply related price changes, it is important to remember that during the economic downturn, when consumer budgets are squeezed, the consumer demand factor is also working to hold prices down.

Meat and Poultry

The CPI for beef and veal, pork, and poultry have declined this year. The major reason for the price declines is increased production, but consumer demand has also had an impact. Pork production has increased a hefty 8 percent and poultry production is up 6 percent. Beef production is up only slightly. Total red meat and poultry supplies, therefore, are record large. The CPI for beef will average less than 0.5 percent below 1991, pork will average more than 5.0 percent below last year, and poultry prices will average about 0.5 percent down.

For 1993 meat and poultry production is expected to increase about 3 percent, with most of the increase in pork and poultry. The large corn and soybean crop this year will put downward pressure feed prices which is an incentive for producers to expand, provided market prices remain above break even. Producers are likely to exercise caution in their expansion plans because of the uncertainty surrounding the recovery of our sluggish economy. Retail prices for red meat and poultry in 1993 are expected to remain fairly flat, averaging in a range of plus or minus 2 percent.

Eggs

The CPI for eggs in 1992 will be about 12 percent below 1991. Egg production is up about 2 percent this year from last and is the primary cause of the drop in price. Consumer consumption of eggs remained fairly stable even though prices showed considerable volatility. Consumption has dropped from 39 pounds in 1970 to 29 pounds in 1990 which translates to about 4 eggs per person per year. The decline in consumption is generally attributed to health concerns particularly about cholesterol.

The lower prices for eggs in 1992 means lower producer prices as well. In 1993 egg production is likely to decline in order for producers to improve their returns. Lower feed prices next year will be a factor in profitability and the decline in egg production will likely be minimal. Retail prices will increase, however, by 4 to 6 percent because of the small decline in production.

Fresh Fruit

The CPI for fresh fruit this year is down 5.5 percent from 1991. Much of the decline in this index can be attributed to the recovery of orange production in California and the resulting lower orange prices. In December of 1990, a hard freeze hit California, destroying most of the orange crop. This event was primarily responsible for a 13.5 percent increase in the fresh fruit CPI in 1991. The decline in fresh fruit prices this year is not enough to offset last years large increase and prices are still high relative to prefreeze levels.

For 1993, the outlook for orange production is good. Expected harvest in California is up 3 percent from last year and the Florida crop is up 33 percent from last year. Florida traditionally only supplies a small percentage of the fresh orange market, however, during the California freeze, Florida's share increased. With prospects of a large harvest this season, Florida is again trying to expand their share of the fresh market. Between Florida and California, orange supplies will be larger and prices are expected to be slightly lower than 1992.

Supplies of apples and pears are also ample, therefore, the CPI for fresh fruit will rise very little if at all. Barring a freeze in either of the citrus growing areas, the CPI for fresh fruit in 1993 is expected to be about level with 1992.

Fats and oils

The fats and oils category of the food CPI also declined this year by 1.6 percent. This was due to large supplies of vegetable oils and a record large peanut crop last fall. Peanut butter prices this year dropped 10 percent from the 1991 average. Peanut butter prices were high in 1991 because of drought damage to the 1990 crop. Food use of peanuts has increased this year which offers some evidence that consumers do substitute peanut butter for higher priced protein sources during economic downturns.

Soybean oil stocks are record large and this season's large soybean crop will add to those stocks. Larger oil supplies will help to moderate any price increases for salad and cooking oils. The peanut crop, however, is 10 percent below last season and prices of peanuts and peanut butter are expected to be higher. As a result, the CPI for fats and oils next year is expected to increase a slight 1 to 3 percent.

Other food categories of the CPI have increased this year, however, most of the increases have been moderate or less than the increase in the total CPI.

Fresh vegetables

Fresh vegetable prices increased about 1.2 percent this year. Much of the increase can be attributed to the volatility of lettuce and tomato prices. Salad vegetable prices tend to increase sharply at the slightest hint of a shortage. Prices can plunge when supplies return to normal. Much of the demand that causes the volatility comes through the away from home market. Salad bars, delicatessens, and fast food outlets all need tomatoes and lettuce. We as consumers expect lettuce and tomatoes on our hamburgers, hoagies, or in salad bars. At the same time, if we look in the grocery stores and see high prices for lettuce or tomatoes, we can walk away. The food service establishment cannot walk away. They must have the products to stay in business and will bid prices up to be sure of having supplies. Partially offsetting higher lettuce and tomato prices were lower prices for potatoes. A particularly large crop last fall kept potato prices below year earlier for most of the year.

In 1993 fresh vegetable prices will likely increase 2 to 5 percent. A smaller potato crop this fall than last will push potato prices up next year. A 14 percent decline in tomato

acreage in Florida this winter will keep tomato prices high through the first quarter of 1993. There is always the uncertainty about cold weather in vegetable growing areas. A cold snap could push prices higher.

Orange juice prices were responsible for the 4.8 percent increase in the processed fruit CPI. Last seasons Florida orange crop was smaller than the preceding year's bumper crop. Orange juice prices in 1992 were still below the levels of two years ago. The 4.8 percent increase was the largest of any of the food categories.

In 1993 orange juice prices will likely decline again, considering the estimated 33 percent increase in Florida orange production. As a result, the CPI for processed fruit will likely decline 1 to 3 percent.

The CPI for dairy products has increased 2.9 percent in 1992. While milk output will be up about 2 percent this year, higher farm prices have been passed through and are being reflected at retail. Although consumer demand has been sluggish for most food products, demand has remained relatively strong for dairy products, particularly skim milk products.

In 1993, milk production is expected to remain about level with 1992 and retail prices are not expected to rise significantly. Consumer demand will likely have some impact on retail prices as the economic recovery continues.

The cereals and bakery products category of the food CPI is up about 3.9 percent from last year. Much of the increase came from manufacturers raising prices because of an expected small wheat harvest. Winter wheat acreage was down last fall and stocks of wheat carried over were also very low. Wheat prices increased, signaling farmers to considerably expand spring wheat acreage. The final result has been a relatively good wheat harvest and wheat prices are expected to be only slightly higher than a year ago. Changes in the price of wheat, however, have a very small effect on the retail price of the final retail product. Processing and distribution costs account for about 90 percent of the retail price. Manufacturers are always criticized for raising prices. Cost increases do accumulate and a well publicized event like the wheat price increase offers an opportunity to adjust prices. Prices for cereals and bakery products never did increase as much as was originally projected by some trade analysts. In fact, cereal prices declined in September and October, possibly the result of depressed consumer demand.

In 1993, the cereals and bakery products CPI is expected to rise 2 to 4 percent. The increase will again be driven by higher

costs for processing and distribution. The sluggish economy and the resulting lower inflation rate will help to keep price rises minimal.

To conclude, the CPI for all food in 1993 is expected to rise 2 to 4 percent above 1992. The rise will most likely be less than the overall inflation rate. Larger supplies of meats and fresh fruits will dampen price rises. Also, consumer demand for food will likely remain sluggish well into the first half of the year. As the economy improves, the CPI for food away from home will rise at a 2 to 4 percent rate while the CPI for food at home is expected to rise 1 to 3 percent. The uncertainties surrounding this forecast primarily concern the economic recovery and how producers and consumers perceive the progress.

Changes in Food Price Indicators, 1990 through 1993

	1990	1991	---Forecast---	
			1992	1993
Consumer Price Indexes			Percent	
Food	5.8	2.9	1.1	2 to 4
Food away from home	4.7	3.4	2.1	2 to 4
Food at home	6.5	2.6	0.6	1 to 3
Meat, poultry, and fish	7.3	2.3	-1.0	-2 to 2
Meats	10.1	3.1	-1.7	-2 to 2
Beef and veal	8.0	2.8	-0.3	-2 to 2
Pork	14.7	3.3	-5.3	-2 to 2
Other meats	9.3	3.7	0.0	-2 to 2
Poultry	-0.2	-0.8	-0.6	-2 to 2
Fish and seafood	2.2	1.1	2.5	1 to 3
Eggs	4.7	-2.3	-12.1	4 to 6
Dairy products	9.4	-1.1	2.9	2 to 4
Fats and oils	4.2	4.3	-1.6	1 to 3
Fruits and vegetables	8.0	4.6	-0.6	1 to 4
Fresh fruits	12.1	13.5	-5.5	-2 to 2
Fresh vegetables	5.6	2.2	1.2	2 to 5
Processed fruits & vegetables	6.2	-1.9	3.0	-1 to 2
Processed fruits	8.7	-3.7	4.8	-1 to -3
Processed vegetables	2.7	0.8	0.4	2 to 4
Sugar and sweets	4.4	3.7	3.2	2 to 4
Cereals and bakery products	5.7	4.1	3.9	2 to 4
Nonalcoholic beverages	2.0	0.5	0.2	0 to 2
Other prepared foods	4.5	4.5	2.2	2 to 4

Source of historical data: Bureau of Labor Statistics; forecasts by Economic Research Service.

Outlook '93

For Release: Wednesday, December 2, 1992

**LONG TERM OUTLOOK AND OPPORTUNITIES
IN FOOD MANUFACTURING**

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The U.S. food industry has evolved into the most diverse, most efficient, and safest system in the world. No other country has the capability of delivering a broader array of quality products to changing consumer tastes in a more cost efficient manner than in the U.S. In other words, consumer preferences are quickly translated into supply response at competitive prices. There is a myriad of factors responsible for this, but the key is a market based food economy, starting with the producer and ending with the consumer.

From the perspective of the food manufacturer, two key industry assets have been rapidly changing technological developments in food production and an unique ability to communicate with the consumer. Technical improvements are reflected in part by the fact that 35,000 new food products have been introduced each of the last two years. These new technologies include, for example, ways to replace fat in animal products by oat or other grain derivatives, ways to more effectively develop foods that taste good microwaved, new forms of packaging that are more consumer appealing, and continued improvements in the taste of all foods.

Effective consumer communication include more sophistication in taste panels and test marketing, the ability to mass advertise the attributes of new food products as well as the ability to label nutritional benefits of food products. To the latter point, 74 percent of consumers indicated in a recent government survey that they read and understand food labels and are able to use them in making nutritious food decisions. Additionally, a variety of private and public groups and institutions regularly help educate the public on the latest developments in nutritional research.

Currently, nearly all phases of the food industry are in the midst of dramatic change. However, if one looks back at the food sector, the one constant in the food sector has been change. Each of the past five or six decades has brought the need for adjustments in the food industry, and the 1990's are proving to be no exception. The balance of this paper will focus on what appear to be the key developments to impact the food sector the rest of this decade and beyond.

ECONOMIC DEVELOPMENTS

The slow growth of the economy over the past four years has had a negative impact on consumer demand. The economy has grown less than one percent annually the past four years. Real per capita disposable income growth has been only about 0.3 percent annually. The public seems to be concerned that recent economic weakness is more than cyclical; it may be more prolonged. The impact of the weak economy has likely been exaggerated by sharply increasing health care costs. Since 1970, health care costs have grown from about 6.5 to nearly 14 percent of disposable income while food expenditures have declined from nearly 15 to 11.5 percent of income. The trade off may not be direct, but food expenditures have undoubtedly been negatively impacted by growing health related expenses as well as the overall weak economy. The rate of increase in food expenditures has been trending down since 1982. Since 1990, real food expenditures have actually declined. The real expenditure for food will likely decline in back to back years for the first time since the depression. Restaurant sales have not increased in constant dollars since 1988, and total deflated grocery sales for food have declined since 1989.

Many project the economic weakness to persist for an extended period of time. Obviously, the budget deficit will not disappear for an extended period and debt remains a problem. However, we are somewhat optimistic the economic situation will brighten beyond 1993 as debt becomes more manageable and expected monetary and fiscal stimulus by a new Administration begins to impact the economy. Productivity growth is also recovering; if it continues, growth may be positively impacted. So, we are somewhat optimistic that the demand structure will improve towards the middle of the decade. Improved demand should impact product mix and distribution differently than the current environment by shifting demand back towards "away from home eating" as well as for more income sensitive food products. Total consumer expenditures for food in real terms, ought to stabilize in 1993, and begin to recover somewhat in 1994 and beyond.

Other changes have occurred in food consumption, at least partially due to the economy. Our data indicates grocery distribution channels have shifted. Since 1990, warehouse and club stores have increased their share of the grocery

business from less than 3 to 15 percent, while supermarkets declined from 67 to 50 percent. The mix of food purchased is also changing, but the driving force is difficult to identify. For example, demand for some premium brands in frozen foods and other areas has been somewhat weak the last couple of years, which one might expect during a weak economy. However, business in the deli case has been brisk, which one would not expect. Private label sales have been weak during the recession, which also seems opposite to expectations. Margins in the basic meat and poultry processing business have been depressed, even though volume has been growing sharply. Red meat sales have been adversely affected by a generally weak economic environment, as well as growing competition from lower priced and expanding poultry supplies.

TECHNOLOGICAL IMPACT

Technical progress impacts the food industry from many directions. It has enhanced farm productivity through improved genetics in crop and livestock production. Manufacturing cost reductions have been realized by the adoption of labor saving equipment, better communication and accounting computer hardware and software, more efficient distribution techniques, etc. Progress is proceeding rapidly to replace fat in products like meat, cheese and other dairy products, and other foods to deliver more food products that are both healthy and meet taste criteria. Packaging advances will both enhance food quality and safety while attempting to reduce the volume of non-recyclable materials.

One might look for three technological developments in particular to gain more momentum in the intermediate term. Labor cost increases may accelerate in anticipation of a somewhat stronger economy affecting wage rates and perhaps more regulations under a different Administration. There will likely be more pressure to utilize labor saving technologies as labor becomes more expensive relative to capital.

Vertical integration will continue in the red meat industry. Production of more predictable, leaner, uniform cattle and hogs can generate efficiencies in the production, marketing, processing and retailing of meat products - across the whole food chain from producer to consumer. Today, there are really no examples of a fully integrated system in place to fully utilize all of the potential efficiencies, but the day that occurs is drawing closer.

Finally, we expect continued advancement in the development of processes to replace fat and sodium in foods, particularly processed meats and dairy products, to manufacture healthier, good tasting products. Longer-term, fat substitutions will have a positive impact on the demand for meat and dairy products.

REGULATORY IMPACT

The amount of regulation imposed by the regulatory agencies has major impact on the cost of production and food costs to the consumer. We are not aware this has been quantified; it represents a good research project. Food regulation right now is a moving target. For example, USDA and FDA have been in the process of trying to issue new labeling regulations for the food industry. This means some 700,000 labels must be redone and 700,000 foods tested extensively for contents of various ingredients in order to meet the new requirements. This represents a one time cost of several billion dollars to the food industry. But, more importantly, the communication link between food manufacturer and consumer may be weakened, depending on how labeling questions are resolved. If the healthy attributes of foods cannot be adequately communicated under new labeling regulations, companies may be disincented from investing money in research and development of new healthy foods.

Food safety legislation represents another area of potential major increases in food costs from two major aspects. The Delaney clause that specifies zero risk standard for manufactured food, as you know, was enacted into law when the scientific community only had the ability to measure products at about one part in one hundred thousand. Now, with the ability to measure one part in one trillion (or a grain of salt in a swimming pool), we are finding something of nearly everything in everything. Zero risk with today's technology implies distilled water and sterile food. Modern science requires new legislation. A negligible risk standard needs to be defined or the potential cost increases to consumers and the food industry are huge. In many cases, zero-risk enforcement would eliminate the manufacture of many foods, would eliminate many smaller food companies and likely result in lower quality, unsafe food. A related major potential cost relating to the food system is a tendency for states to develop their own food safety and labeling requirements. The cost of manufacturing specific products for specific states would be prohibitive. Ideally, the food system needs sound, scientific federal food regulation and federal preemption for labeling and food safety requirements.

We could talk about other issues such as changing OSHA requirements, new FDA enforcement proposals, proposed packaging requirements, and the need for tort reform. All can seriously impact food costs, industry structure, and the ability to provide the consumer the kinds of products desired, but brevity limits those discussions for another forum.

GLOBAL DEVELOPMENTS

The impact of globalization manifests itself in several ways on American agriculture. The sharp fluctuations in exchange rates have affected U.S. competitiveness. The weaker dollar over the last several years has priced U.S. agricultural products more favorably in world markets and stimulated demand for our products. However, the same weaker dollar has made the price of U.S. businesses more attractive to the Europeans and Japanese and encouraged foreign investments in U.S. agriculture. Today, offshore based companies own over 25 percent of the U.S. input industry and 20 percent of U.S. agricultural processing. The weaker dollar has also made it more difficult for U.S. companies to justify foreign investment. Consequently, large European or Japanese agricultural companies are expanding globally and speeding up the trend towards concentration of agriculture, worldwide.

The playing field upon which world trading structures are developing is not level. Free trade does not exist. The increasing concentration of power highlights the importance of negotiating a successful conclusion to the Uruguay GATT round. The alternative is almost certain to be a trade war, the intensity and duration of which is unpredictable.

Secondly, the emergence of large worldwide trading blocks is making world trading more competitive. The trend towards unification of the European common market is making the EC a more formidable trading entity in world agricultural markets. The reduction of intra EC barriers and more uniformity of regulations is encouraging rapid concentration of agribusiness there. The emerging financial strength of the Pacific Rim Countries is creating both a rapidly growing market and strong competitors in world markets.

Globalization of the food system also implies the U.S. cannot adopt tax policies, regulatory policies, or technology related policies in a vacuum. These all have a major impact on food production costs and help dictate whether food, and therefore jobs, are produced in the U.S., or Europe, or the Pacific Rim, or somewhere else. U.S. policies need to be determined with an alert eye focused abroad, or job growth in the U.S. food industry, as well as other industries, will continue to languish.

CHANGES IN TASTES AND PREFERENCES

Consumption patterns have changed rapidly in the last 5, 10, and 20 years. There are some trends in consumption that are consistent with consumer attention to nutritional concerns, and other patterns suggest something different. Thus, the

impact of nutritional interest is difficult to measure in an overall sense. Other factors like convenience, demographics, and the overall taste appeal of certain food ingredients cause a somewhat schizophrenic appearance to consumption patterns.

Food consumption patterns since 1970 show that consumption of products like cereals, fruits and vegetables, juices, poultry, and seafood have grown rapidly. Consumption of cholesterol, sugar, coffee and eggs have declined. More recently, the growth of frozen meals, meats, cheeses, soups and other products low in fat, cholesterol, and sodium has been strong. These trends are consistent with consumers concerned about a healthy diet. On the other hand, consumption of fats, sweeteners, soft drinks, and calories have also been growing rapidly, as well as fast food consumption; these trends are consistent with consumers more worried about taste and convenience. This all likely implies that consumers will generally not sacrifice taste for nutrition.

Trends in the future will likely continue to reflect some schizophrenia in consumption patterns. We do expect the trend towards more nutritious foods will continue so long as the industry is able to communicate properly with consumers. The technology will continue to improve to reduce fat and sodium in a broader spectrum of foods with no loss of taste. These products will continue to be introduced and will be accepted by consumers. One might expect fiber content to be a nutritional issue in the future as more research comes into focus on cancer-fiber relationships. Demographics and lifestyles will place even more emphasis on convenience foods. Expect a broader array of products to be adapted to the microwave as research and development dollars are spent in this area. Finally, as mentioned earlier, consumers will not abandon taste, so the future should continue bright for meat products, as well as lower saturated fats and sweeteners.

SOCIETAL PERCEPTIONS

Agriculture and the U.S. food system have historically been the beneficiary of a relatively generous policy environment and favorable public perception. Land grant colleges and the USDA were established in large part to deliver new technical advances to agriculture as well as provide income support and stabilization. A Farm Credit System was established to provide guaranteed credit to farmers. Producer tax treatment has been favorable, and food aid programs have been generous. The public has historically held an idyllic view of farming and was comfortable with its food supply.

However, life has changed in the politics of agriculture. Today, we hear about insensitivity to animal's feelings, risk of environmental disasters, inequitable treatment of small farmers, exploitation of natural resources, and wasteful and

deceptive advertising. Colleges and USDA are focusing more on regulatory issues and less on technical development. Virtually none of these concerns persisted before 1980, but have arisen during the 1980's. This was ironically a period in which the U.S. food system delivered safer, more diverse, more affordable and more nutritious food than ever before.

Consequently, it is extraordinarily difficult to perceive what the 1990's will bring. We do know, producers and businesses will be impacted in the way we grow, manufacture, and market food products.

IMPLICATIONS

The complexity and diversity of factors impacting the food industry make very specific conclusions about the future difficult. There are, however, a number of observations that can be made.

The demand environment should recover from the last two to three years as the economy rebounds cyclically, but consumer food expenditures will remain under pressure as income growth is expected to remain below long term trend. Other studies have concluded that aggregate demand will grow at a rate of only 1 to 1.25 percent this decade, and we do not disagree. The federal deficit will prevent fiscal policy from becoming very stimulative and health care requirements will likely continue to curtail consumer expenditures for other purposes.

Food manufacturers will remain under pressure to constrain costs. Rising labor and regulatory costs will cause food companies to invest more in labor saving technologies. Research and development expenditures, as a result, may slow somewhat. There may be some likelihood that the rate of introduction of new products will slow. The increased dollar and human resource costs required to comply with still somewhat uncertain labeling regulations will at least temporarily divert attention from other efforts.

Two patterns of food consumption that appear very likely to continue are increasing demand for more convenience and increasing demand for more nutritious foods. Population demographics and income pressures on two worker families will create even more demand for convenience. This implies that prepared food, deli food and fast food consumption will continue to grow. More microwave technology will be adapted. Food nutritional developments will continue to attract considerable press and public attention. As a result, demand for more nutritious food in terms of lower fat, lower cholesterol, lower salt, and more fiber ought to continue, as long as taste is not compromised.

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Outlook '93

For Release: Wednesday, December 2, 1992

IMPACTS OF POLICY ON THE ECONOMICS OF SUSTAINABLE AGRICULTURE

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Government policies and programs have important impacts on the comparative economics of alternative systems of farming. American agriculture today is, in no small part, a reflection of government policies and programs of the past. Changing human values and technological possibilities may have dictated the fundamental nature of economic development in agriculture, as in other segments of the economy. However, the environmental, economic, and social consequences of development, and the resulting structure of the agricultural economy reflect choices of public policies and programs to support the development process.

The purpose of this presentation is to examine the impacts of agricultural policies on the economics of sustainable systems of farming. The conclusions reached here are based on deductive reasoning rather than model-based simulations of the agricultural economy under alternative policy scenarios. Policy impacts on the agricultural economy are more a reflection of a dominant political philosophy than of any single policy or set of policies that might be modeled and simulated.

Policies Impacting the Agricultural Economy

Government programs designed to stabilize commodity prices have been the most costly, and perhaps the most important, U.S. agricultural policies of the past. Farmers' prices for program commodities such as corn, wheat, cotton, and peanuts have been supported by various means to ensure that they will not drop below predetermined levels. In return, farmers have been required to comply with various supply control programs to reduce surpluses that periodically result from prices set above market clearing levels. Various food distribution programs, including the school lunch and food stamp programs, were justified, at least in part, as means of utilizing surplus farm commodities. The current export enhancement program is the most recent effort to remove surplus agricultural production from U.S. markets.

Various land retirement programs, such as the current acreage reduction program (ARP) and conservation reserve program (CRP), were designed to control production and reduce government costs of supporting prices for farm commodities. Only land classified as highly erodible can be accepted in the CRP program. This provision was a compromise between political forces supporting price stabilization and those supporting soil conservation.

Livestock producers often boast that their markets are not supported by government programs. Dairy is an obvious exception in that milk prices have been consistently supported at surplus creating levels. Beef, pork, and poultry producers also are supported, but indirectly through the government programs that assure adequate supplies of feed grains at reasonably stable prices. Livestock interests have also been successful in limiting cattle numbers by severely restricting haying and grazing privileges on various lands removed from crop production by government programs.

Some soil and water conservation programs are essentially separate from commodity programs. However, of many these programs have been administered through the United States Department of Agriculture (USDA). The primary emphasis of policies carried out by the Soil Conservation Service of USDA has been to conserve soil and water resources and to protect water quality. However, these programs have been implemented by means that consistently put a high priority on maintaining or increasing agricultural production levels.

Farm Credit has been another important element of past agricultural policy. The implicit justification for the Farm Credit System has been that farming is inherently more risky than most other industries, that farm profits are not sufficiently large enough to offset these higher risks and, thus, the government must either guarantee or subsidize farm credit to prevent under-investment in agriculture. Various levels of government involvement in farm credit are reflected by programs ranging from Production Credit Associations, which compete directly with commercial lenders, to the Farmers Home Administration, which makes farm loans in cases where commercial lenders will not.

Agricultural marketing programs have ranged from the federal Market News Service to export promotion programs, such as the Foreign Agricultural Services. Government oversight and regulation of markets, ranging from the local livestock auctions to the Chicago Board of Trade, have impacted the nature of farmers' marketing alternatives. A lack of access to efficient markets can destroy the economic viability of any particular system of farming.

Tax policies have also had a variety of impacts on U.S. agriculture. Investment tax credits have reduced the net cost of farmers' investments in farm equipment and specific types of production facilities. Preferential treatment of capital gains as opposed to ordinary income has increased net returns associated with appreciation in land values and in other farm assets held for investment purposes. Tax reform legislation passed since 1986 has greatly reduced agricultural tax impacts; however, reinstatement of some type of investment tax subsidy seems likely in the current political climate.

Finally, publicly funded research and education have helped to shape the fundamental nature of today's agricultural economy. The primary focus of publicly funded research and education has been on improving production efficiency. Advances in research based technology has provided profit opportunities for innovative farmers, but the primary benefits have accrued to consumers in terms of lower costs for food and fiber. The emphasis on technological innovation as a means of increasing productivity has had important implications for the economics of alternative systems of farming.

The Fundamental Purpose of Agricultural Policy

The fundamental purpose of public policy is to resolve inherent conflicts between the short run interests of individuals and the long run interests of society as a whole. In many cases, profit incentives derived from free market prices will provide adequate motivation for individuals to act in ways that are also in the best interest of society. In other cases, free market incentives will encourage, or even force, individuals to act in ways that are in conflict of the long run interest of the larger society of which they are a part. In such cases, society, through the public policy process, must provide incentives; in the form of subsidies, penalties, or regulations; for individuals to make decisions that are consistent with the welfare of society as a whole.

Agricultural policy provides an historical example of the fundamental role of public policy. The historical purpose of agricultural policy has provided incentives for individual farmers to support the American industrial revolution. At the turn of the century, a large proportion of the U.S work force was engaged in farming and a large proportion of consumers' incomes was spent on food and fiber. Industrialization required "manpower" to run the factories and discretionary consumer income to buy the things that the factories would produce. Agriculture had to become more productive and efficient to reduce agriculture's claim on consumers' incomes and to free farmers and their families to work in the factories and offices of an industrial economy.

Government programs for agriculture were designed to increase agricultural productivity by substituting mechanization for farm labor and industrial technology for individualized farm management. Commodity price stabilization programs reduced the risks that are inherent in agricultural markets and allowed farmers to make long term investments in specialized farm equipment, production facilities, and technologies. Without price support programs, farmers would have been forced to maintain diversified farming systems and would have been less able to absorb the risks of large commodity specific capital investments.

Government supported marketing programs have also been of primary benefit to large scale specialized producers of agricultural commodities. For example, government regulated commodity futures markets have been of practical use only to large scale producers who can deliver commodities in truck-load or train car-load lots. The large terminal markets for livestock have largely disappeared with increased reliance on direct sales between large producers and processors and contract production. However, there has been no major initiative on the part of the government to maintain market access for smaller, diversified farmers. The loss of access to public markets has pressured farmers to specialize and enlarge their operation in order to negotiate competitive prices for the things they produce.

Farm credit programs subsidized capital investment in agriculture and reduced the need for farm labor and individualized farm management. In general, those who borrowed and invested most benefited most, leaving those who invested less aggressively at a competitive disadvantage. Subsidized credit made capital investment in agriculture possible even during long periods of chronically depressed farm incomes. The Farmers Home Administration, the lender of last resort, has played a more important role in moving farmers out of agriculture than in keeping them in.

Preferential taxes further added to farmers' incentives to invest in new machinery and equipment. Tax laws also encouraged large farmers and outside investors in higher tax brackets to buy farm land as a hedge against inflation. Land speculation supported farm land prices and encouraged its consolidation under control of those farmers who were winning in the race to specialize and mechanize in order to achieve the economic efficiencies from large scale agricultural production.

Soil and water conservation programs have also encouraged the trend toward large scale specialized production. Government cost sharing on terraces and various other soil and water conservation structures were of the greatest benefit to those who were willing and able to match government funds with money of their own. No

similar benefits were provided for those who used crop rotations, strip cropping, cover crops, or simply left highly erodible lands in permanent cover. In fact, many soil conservation programs encouraged farmers to abandon such cultural practices and move toward more intensive, more specialized systems of monocropping. For example, cost sharing on the construction of terraces has encouraged farmers to put row crops on hillsides that were previously in pastures.

Water conservation programs, in many cases, have become subsidized irrigation programs. Irrigated agriculture tends to be capital intensive, specialized, large-scale agriculture. Irrigation removes much of the production risk associated with specialized agriculture and makes possible the large investment that is required for its implementation. Government subsidized crop insurance has had an impact similar to irrigation in reducing production risks and thus allowing farmers to specialize and expand their production of specific commodities.

Publicly funded research and education has developed new technologies that substitute mechanization for farm labor and commercial inputs for individualized management. Research and educational institutions have contended that their search for new technologies has been scale-neutral. However, few would deny that the primary focus of agricultural research has been on developing technologies to increase agricultural productivity. Productivity has been measured in terms of yields per acre of land, agricultural output per farmer, and overall economic costs of production. The productivity objective and its associated measures of success undeniably have impacted the research and education agenda and, thus, have impacted the economic viability of alternative systems of farming.

The ultimate objective of publicly funded programs in agricultural research and education, resource conservation, farm credit, marketing, and price stabilization have all been to reduce consumers' costs of food and fiber and to support economic progress of the nation. The most efficient means of achieving those objectives has been through implementing industrial strategies such as specialization, mechanization, routinization, and mass production of agricultural commodities. The objective was not necessarily to industrialize agriculture, but rather to make agriculture more efficient. However, the results are the same. Public policies have helped make U.S. agriculture more "efficient" through a process of industrialization.

Policy Impacts on the Economics of Sustainable Agriculture

Most would agree that the industrialization of agriculture has greatly increased output per acre and per farmer and has reduced the economic costs of food and fiber to consumers. However,

changes in farming methods that account for most of the increases in agricultural productivity have now become the primary source of environmental and social concerns regarding long run agricultural sustainability.

The Food, Agriculture, Conservation and Trade (FACT) Act of 1990 provides a definition of sustainable agriculture. "The term 'sustainable agriculture' means an integrated system of plant and animal production practices having a site-specific application that will, over the long-term: (A) satisfy human food and fiber needs, (B) enhance environmental quality and the natural resource base upon which the agriculture economy depends, (C) make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls, (D) sustain the economic viability of farm operations, and (E) enhance the quality of life for farmers and society as a whole" (U.S. Congress, Title XVI, Subtitle A, Sect. 1603).

The final objective, to enhance quality of life, was further clarified in colloquy related to the bill on the floor of the House to include farming systems which "increase income and employment -- especially self-employment -- opportunities in agriculture and rural communities and strengthen the family farm system of agriculture, a system characterized by small and moderate-size farms which are principally owner operated" (U.S. Congressional Record -- House, August 1, 1990, H6601)

The concept of sustainable agriculture represents a new public policy mandate for agriculture. Agricultural policies of the past have focused almost entirely on satisfying human food and fiber needs; only one of the multiple objectives of a sustainable agriculture. However, food and fiber needs have not been met by integrated systems of plant and animal production but rather by specialized systems which treat each enterprise as a separate profit center within the farm business. The technologies developed and transferred to farmers have not been site-specific and individualistic but rather have been mass production technologies developed for mass distribution and wide-scale adoption among large numbers of farmers.

Farms with unique and diverse resource bases, such as a variety of soil types and a varying topography, are not well suited for industrial production methods. Thus, farmers who own or operate such farms have been left at a distinct economic disadvantage by the agricultural policy agenda of the past several decades. Those who have chosen to rely on intensive management of highly integrated farming systems have been forced to compete with neighbors who have been subsidized to specialize through a variety of government programs.

Environmental concerns reflected in the sustainable agriculture issue are associated primarily with industrial methods of agricultural production. Commercial pesticides and fertilizers; which are absolute necessities for large-scale, specialized agricultural production; are primary targets for those concerned with the negative environmental impacts of agriculture. Commercial agricultural chemicals are routinely detected in groundwater, lakes, and streams through periodic monitoring. Runoff from large-scale, confinement livestock and poultry feeding operations also pollute water supplies in many areas of the country.

Scientists disagree on the extent and magnitude of water quality risks associated with industrial farming practices. However, most would agree that farmers who reduce their reliance on chemical inputs or produce livestock and poultry in open fields face serious competitive challenges in maintaining the economic viability of their operations. Even more significant, such farmers must meet these challenges with little assistance either from government subsidies and incentive programs or from research and education programs relevant to their approach to farming.

Economics of the market place dictate decisions regarding protection and utilization of natural resources within industrial systems of farming. Markets do not place a significant value on costs and benefits that are expected to accrue more than three or four generations into the future. Discounting is a process used by economists to calculate the present value of costs or returns that are not expected to occur until some time in the future. Discounting is the reverse of compounding interest to determine the future value of a current investment. Market driven incentives are reflected in discounted net present values calculated by using market rates of interest.

At any reasonable market interest rate, the present value of very large sums of money approaches zero if discounted over a few hundred years. For example, at an interest rate of 7 percent, the present value of \$1 million that will not be received until 200 years from now is only \$1.32. The present value of a future cost of \$1 billion is only \$1.53 if those costs can be deferred for 300 years. Farmers who are forced to focus on short run economic survival, in essence, are forced to ignore long run social costs or benefits associated with resource management. Past government farm programs have forced many farmers to focus on short run economic survival and, thus, to largely ignore their depletion of the resource base needed to sustain production over the long run.

A sustainable agriculture must sustain the economic viability of farming operations. By this measure, agricultural programs of the past have been a complete failure. A century ago, the 1890

U.S. Census indicated that more than approximately 22 million people, 40 percent of the population, lived on farms. A hundred years later, only 4.6 million people, less than 2 percent of total U.S. population, live on farms. In addition, those living on farms today earn more than half of their income from non-farm sources. Policies of the past have been designed to move people off farms and into the offices and factories in the cities. These policies have not provided positive incentives for farmers to move, but rather have created an economic environment in which farmers were forced to leave farms, even if they had no place else to go.

Farm policy rhetoric has supported the preservation of family farms and restoration of farm profitability. However, the consequences of farm policies of the past have been the exact opposite for most farm families. The agricultural industrialization process has been driven by farmers pursuing greater profitability. However, the industrialization of agriculture was a process which ensured, by its very nature, that most farmers would fail.

The promise of profits has motivated farmers to adopt new industrial technologies and methods of farming. However, those profits accrued only to the early adopters. Production increasing technologies and methods reduced farmers' costs, leaving a profit gap between production costs and prices. But as more farmers adopted a given technology or method, production increased and prices fell, first squeezing and then eliminating the previous margins of profit. The incentive for later adopters was survival rather than profitability, and those who adopted too late didn't survive. This was the process by which farmers were "freed" from their farms to pursue occupations elsewhere.

New technologies frequently involved increased reliance on purchased inputs. As commodity prices fell and purchased inputs rose, each new round of profits per bushel or per hundredweight became smaller than the last. Farmers had to increase production more and do it more quickly in order to maintain their previous total profit levels. All but a few farmers found themselves fighting harder just to survive. Farmers were forced to buy out their faltering neighbors in order to stay in business themselves. With each new round of rising input costs and falling prices, the vicious cycle became even more vicious.

Obviously, the industrialization process has not enhanced the quality of life for most farmers or for others who live and work in rural communities; the final objective of a sustainable agriculture. The viability of a rural community is more a reflection of the personal success of its people than of the level of output of its farms or factories. As farm families have

been forced to abandon their farms, rural communities in agricultural areas have suffered, withered, and died.

Many doubt that the incremental benefits to society from lower costs of food and fiber can any longer offset the rising human costs of social decay, environmental degradation, and resource depletion in rural areas. Policies that have supported agricultural industrialization have not provided new economic opportunities in agriculture or in rural communities, nor have they strengthened the family farm system of agriculture. Small and moderate-size farms that are principally owner operated have been replaced by large, specialized operations that are managed as a profit maximizing corporation, even if they are family owned.

The Necessity for Change in Agricultural Policies

Agriculture has fulfilled its public mandate for the twentieth century. Workers have been provided for factories and offices. Expenditures on food have dropped. Food production probably claimed well over 50 percent of the nation's resources in 1890 with resources used in transportation and marketing added to those represented by the 40 percent of the work force engaged in farm production. A hundred years later, food costs now amount to less than 12 percent of average consumers' incomes.

Farmers today receive only about 20 cents of each dollar spent for food. The rest, 80 cents, goes to marketing firms. In addition, farmers get to keep only about half of what they receive, or 10 cents of each dollar that consumers spend on food. The other 10 cents pay for purchased inputs including rent, hired labor, and interest on borrowed money. Margins between input costs and commodity prices have been squeezed to the point where there is now very little left to be squeezed out.

Claims that farmers will benefit from still further reductions in costs of farm-based production are no longer credible. Farmers' resistance to introduction of genetically engineered growth hormones for dairy cattle and hogs reflects a growing awareness of the futility of farming on a technological treadmill. Farm profits of the future must come from widening the margins between input costs and market prices. Most farmers have nothing to gain from technologies that raise input costs, increased production and, thus, reduce market prices.

Society, likewise, has little more to gain from further increases in farm level productivity. Consumers don't want their food costs to climb back to percentage levels of a few decades ago, but there is little prospect for further price declines, at least not as a result of increasing agricultural productivity. If the efficiency of farm-based production could be increased by an

additional 10 percent, which would be a significant technological achievement, total costs of food production would drop by only about one percent. Likewise, a 10 percent reduction in farm-level efficiency would raise food costs by about one percent. Changes in farm-level productivity no longer have a major impact on consumer costs of food.

The farmer's share of total consumer expenditures, including food and all other items, is even less significant; less than 1.5 percent. Thus, a 10 percent drop in farmers' claims to total consumer expenditures would amount to less than two-tenths of a percent of total consumer expenditures. Farm level production innovations of this magnitude would likely become lost in aggregate economic statistics and would be undetected by either policy makers or consumers.

The agricultural policy mandate of the past has been fulfilled. The policies of the past may have been justified by the social mandate for agriculture during the industrial era of development. But there is little further potential benefit from continuing those policies during the post-industrial era of the future. Rising ecological risks and social costs of further agricultural industrialization must now be weighted against rapidly disappearing economic and social benefits of policies that continue to support industrial methods of farming. The rise of sustainable agriculture as a public issue reflects the judgement of many individuals that policies supporting the industrialization of agriculture may have already gone too far.

The New Mandate for Agricultural Policy

Society appears to be giving agriculture a new mandate for the twenty-first century; a much broader mandate than that of the past. The new mandate is to develop a food and fiber system that continues to be efficient and productive but, in addition, is ecologically sound, economically viable, and socially acceptable. Acceptance of this new mandate will require a different perspective on the purpose of agricultural policy and on the programs needed to achieve a new set of policy objectives.

The fundamental purpose of public policy is to reconcile differences, real or perceived, between benefits and costs to individuals and benefits and costs to society in general. There is no conflict between economics and ecology for individuals or society in the long run. Farming systems must be environmentally sound or they will not be economically viable over the long run. Systems that poison the people's water in the process of producing their food are neither socially nor economically viable over the long run. Consequently, only those systems that are environmentally sound will be economically viable. However, important conflicts do exist between economics and ecology for

individual producers and society in the short run. Society as a whole faces similar conflicts between short run decisions and long run consequences.

In the short run, farming systems that are the most profitable for individuals may not be environmentally sound. Farmers may be well aware of environmentally sound alternatives but not be able to use such systems because they are unprofitable. Farmers may identify individual trade-offs by asking three simple questions regarding current farming practices and methods: (1) How would I farm this land differently if I had to make a living on this farm a hundred years, or even a thousand years, from now? (2) How would I farm this land differently if I had to live downstream or downwind from this farm over the next hundred or thousand years? (3) Finally, among those things that I would do differently, which can I afford to do and still make an acceptable economic return from this farm next year, over the next five years, or over my lifetime? The things that farmers would do differently but cannot afford to do differently reflect their individual trade-offs between economics and the environment.

Resource conservation and environment protection can be achieved only by sacrificing some potential level of short run profits. Many farmers choose to forego some potential profits to conserve their resource base or protect the environment. But there are limits to the sacrifices that individual farmers are willing and able to make in order to serve the greater social good. Thus, public policies must be used to either impose environmental constraints through regulations or penalties or to offset foregone profits with incentive payments or targeted subsidies.

Trade-offs between short run and long run benefits and costs exist for society as well as for individuals. The current generation must make some level of economic sacrifice to ensure a clean environment for future generations. We value individual benefits which we expect to accrue to us, to our children, or to our grandchildren, but not much beyond that. We as individuals will consider costs that we impose on our children, or grandchildren, but not much beyond that. If we rely solely on individual incentives of the marketplace, we will exploit our resource base and degrade our environment to maximize benefits of ourselves and our anticipated offspring. Collectively; however, we may feel a social or moral responsibility to preserve the opportunity for an acceptable quality of life for many future generations or for the long run survival of humanity. Collectively, through government policies, we may be willing to make sacrifices that we are unwilling or cannot afford to make as individuals.

Resource conservation and environmental protection represent "investments" in long run productivity for individuals and for

society as a whole. As in the case of making financial investments, current gratification must be foregone in order to ensure long run viability. Most people don't purposely exploit resources or degrade the environment for short run gratification. Likewise, most farmers don't maximize profits by exploiting their physical or social environment. However, public policies must be developed to ensure that it is at least economically possible for individual farmers in the short run to utilize systems that are also environmentally sound and, thus, sustainable over time.

The new agricultural policy mandate will require that current commodity based programs be decoupled from their current objective of price stabilization and supply management and recoupled to the multiple objectives of agricultural sustainability. The new mandate will dictate that a portion of publicly funded research and education programs be diverted from technology development and transferred to support integrated systems approaches to managing diversified, site-specific farming operations. The new mandate will require policies and programs that empower people to make individual decisions that further their own and the public's interest in the long run sustainability of agriculture. The new mandate will require institutional change.

"Laws and institutions must go hand in hand with the progress of the human mind...We might as well require a man to wear the coat that fitted him as a boy, as civilized society to remain ever under the regiment of their ancestors."

-- Thomas Jefferson

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Outlook '93

Final version for published proceedings

ENVIRONMENTALLY SOUND FARMING PRACTICES

Tom Frantzen

President, Practical Farmers of Iowa

I was asked to give my perspective on environmentally sound farming practices. If the natural resources in our nation were under sound, long term management, this topic would be irrelevant. Any society that expects to last must manage its resources in ecological harmony. How else could the production of food and fiber be assured for future generations? Yet, our country continues to this day to care for precious natural resources in a sordid fashion. Why does this continue? How long can it last? These troubling questions expose our nations failing in developing good stewardship.

The sustainable agriculture movement, by its very nature, understands the importance of environmentally sound farming practices. I have been involved in this movement since 1983.

If we improve our understanding of the forces that shape our natural world, we can better understand what types of agricultural practices can be labeled sound. What are the forces? According to Allan Savory in Holistic Resource Management (1988 Island Press), our ecosystem has evolved through the effects of water cycle, mineral cycle, energy flow from the sun, and a community development process known as succession. These forces are not difficult to understand. An effective water cycle makes maximum use of rainfall. Runoff is held to a minimum, causing no erosion, and is clear of sediment. A 4" rain with 3" of runoff provides just 1" of effective

soil penetrating precipitation. Soil cover and soil condition are the key elements in making rainfall effective.

The mineral cycle is another fundamental force developing our world of natural resources. A good mineral cycle thrives in a biologically active soil. A diversity of plant rooting systems, animals, and microorganisms work in harmony to constantly cycle and recycle minerals. The mineral cycle provides the long term elements necessary to sustain life. Soil erosion and agricultural cropping systems that require increasing amounts of outside inputs are examples of poor mineral cycles. Consolidation of livestock farms often result in constant livestock numbers, yet their manure waste usually becomes an environmental liability. Soil that could utilize manure has none while other fields are overlooked. This practice, widespread today, is in violation of good mineral cycling.

The world of nature evolved with using solar power as its energy source. We must always remember that fossil fuels, although they are really solar energy stored by plants, are inedible and not a renewable source of energy. As we eventually exhaust our supplies of these fuels, our agricultural practices will be drastically altered. Agriculture must learn to harvest the sun's energy. It cannot continue to be a mining operation powered by fossil fuel reserves.

The successional process is really what happens to living beings of all forms in the presence of water and minerals, with the assistance of energy from the sun. Communities of species develop (evolve) with incredibly complex interrelationships within each other. Everything is related to everything else. Nothing lives in a vacuum. Succession can be viewed as a natural process, moving communities toward a state of complexity and stability. We can view these relationships in a prairie or a forest. There is much activity, but a condition of stability and complexity is the direction of the living community.

As we develop our understanding of these forces, a better view of environmentally sound farming practices come into focus. We can now test agricultural practices as to their effect on the natural world. For example, what is the effect of plowing grasslands and planting endless rows of monocrops? The plowing destroys soil cover exposing the land to wind and water erosion. The monocropping system further damages the land by upsetting the mineral cycle and reducing plant and animal species diversity. Could we abate this destructiveness by using no-till, and rely on chemical pesticides to control weeds and insects? No-till does leave the soil surface covered and does reduce wind and water erosion. But, it fails to deal with the true cause of the problem. Any monocropping system upsets complex balances and reduces the effectiveness of the water and mineral cycles. The reliance upon petrochemicals to control pests and provide nutrients further upsets these balances by destroying soil microorganisms and inhibiting processes such as the conversion of nitrogen from the air to a form that plants need. No-till has the potential of harming rural communities by allowing farmers to expand the acres they farm, driving other farmers off the land. Most of the conversion from grassland to row crop production has already taken place in this country. Can we farm with techniques that would not endanger the cycles and processes mentioned earlier?

I am currently president of the Practical Farmers of Iowa. This private, not for profit organization exists to research the issue of sustainable agriculture and educate the public on our discoveries. We are learning to judge the merit of our practices, at least in part, by their ability to coincide with good water and mineral cycling, efficient use of the sun's energy, and the existence of stable and complex communities of plants, animals, microorganisms, and, yes, people!

One of the founders of our organization, Dick Thompson, has received national recognition for his development of ridge tillage row crop farming without herbicides. Ridge tillage leaves the soil covered to prevent erosion, improves water infiltration (Dr. D. Karlan, 1992, National Soil Tilth Laboratory). This system utilizes livestock manure easily and allows for diversity of crop species. Dick Thompson has done extensive work on incorporating cover crops with ridge till. This work has been very successful. (Thompson Annual Report, 1991). Ridge till without herbicides and with the use of cover crops appears to benefit the water and mineral cycles. It helps harvest the sun's energy in an efficient manner. The community process of living organisms should move to a high level under this type of management.

In cooperation with researchers from Iowa State University, our organization pioneered the concept of strip intercropping. This cropping system, often done with ridge tillage, captures sunlight in a manner that boosts corn and small grain yields (Dr. R. Cruse, 1990, Leopold Proceedings). The water and mineral cycles are also benefited (Dr. R. Cruse, 1992, personal communication). Plant and animal diversity is also increased (Heidi Stallman, animal ecology grad student, 1992, personal communication). Practical Farmers of Iowa have 12 farmer cooperators experimenting with this new farming concept since 1989. Our results in 1992 are the best we have ever observed, (P. Mugge, cooperator, 1992, personal communication). Strip intercropping, judged by the ecological cycles and processes detailed earlier, promises to be an important development in our search for a sustainable agriculture.

Practical Farmers of Iowa is actively promoting a concept of intensive grazing management known as planned grazing. The pioneering work here was done by Andre Voisin in France, in the 1950's. The development and implementation of this tool has largely been done by Allan Savory and his associates

at the Center for Holistic Resource Management, Albuquerque, New Mexico.

Planned grazing is a natural tool. When properly used, it enhances the water and mineral cycles, captures sunlight energy and aids the advancement of succession of plant, animal, and micro life communities. Our farmer cooperators are learning to use this tool to farm in an environmentally sound fashion and to make a profit, too. Planned grazing in conjunction with grass based seasonal dairy production could provide economic prosperity in many rural communities. The Practical Farmers of Iowa demonstrate many farming techniques. None of them have the potential to stabilize agriculture that planned grazing has.

Environmentally sound farming practices require a skilled and educated farm population. As we improve our understanding of the forces that shape our natural world, we must develop the skills to adopt our farming techniques to harmonize with those forces. Sustaining and educating our rural population lies at the center of this transition.

Session 26Wednesday, December 2, 1992

**PARTNERSHIPS FOR A SUSTAINABLE AGRICULTURE:
AN AGRICULTURAL INDUSTRY PERSPECTIVE**

by Raymond F. Eid
Consultant, Du Pont Agricultural Products

It is a pleasure and privilege to share with you an industry perspective on sustainable agriculture. My own background and career have given me a global view of agriculture. I have been in the agricultural industry for a good many years and seen tremendous changes in the way we produce food and fiber. I have experienced the transformation of farming in Europe, the adaptation of modern technology in developing countries, and the extraordinary growth in U.S. production. And the last two years have been among the most exciting as I have worked with people throughout this country to help the agricultural community understand the meaning and implications of sustainable agriculture.

I come here today as one representative of the agricultural industry. I come to talk with you about what my company, Du Pont, is doing to promote sustainability and, more importantly, to stress once again that partnership -- meaningful partnership between the public and private sectors -- is the backbone upon which a sustainable agriculture must be built.

No one in this room is unaware of the tremendous global challenge facing agriculture. Let me review this challenge for a few moments.

Today's population of 5.4 billion is forecast to grow to eight billion by the year 2020. The world food supply must double in the next 30 years to meet this growth and provide the improved diet needed by so many people on this planet. The world's food reserve is only 45 days. Crop failure in the European Community or the United States could mean worldwide food shortages.

There is a limited natural resource base. In 1960, about one acre of cropland was available to support the food and fiber needs of one person. Today, only three-quarters of an acre is available. In just 30 years, this will have dropped to less than a half acre.

Weeds, insects, and plant diseases are all vying for a piece of the agricultural pie. In 1990, for example, pest and weed damage to U.S. crops according to the American Farm Bureau Federation was estimated at over 20 billion dollars.

At the same time as we face this enormous challenge -- more people, less arable land, and unrelenting crop pests -- the public is becoming increasingly concerned about agrichemicals, one of the major tools that has enabled the farmer to give Americans the most abundant, inexpensive, and safest food in the world.

Today the public is asking more of our industry. The farmer is asking more. Government is asking more. And what does "more" mean? Essentially, society wants our industry to make sure that quality of life and environmentally sound practices are intrinsic parts of our agricultural system. Society wants us to ensure that agriculture is sustainable, that it nourishes us today and safeguards the land for future generations.

So how does a company like Du Pont define sustainable agriculture? We take a holistic view of sustainable agriculture in which agriculture is productive, socially acceptable, economically viable, and environmentally sound. These four components work and thrive together to achieve a balanced, sustainable system -- be it at the farm, national, or global level.

This system is driven by the values and goals of society as expressed by all agricultural stakeholders be they farmers or consumers, manufacturers or researchers, regulators or environmentalists. Two important factors -- public policy and science and technology -- shape the sustainable agriculture system. I'd like to discuss one of these factors -- science and technology -- because it is there where industry and companies like Du Pont play their most important role.

Science and technology's role in sustainable agriculture is to produce the tools that will help the farmer balance production, economics, quality of

life, and the environment. These tools might include cultural practices, crop varieties, natural enemies, diagnostics, biotechnology, agrichemicals, biologicals, and expert systems.

Let me first start with the technology you most often connect with Du Pont -- agrichemicals. We believe that agrichemicals such as the sulfonylurea herbicides are a vital tool in achieving a sustainable agriculture. Since their introduction in 1982, we have commercialized 12 new sulfonylurea herbicides including ACCENT®, our newest post-emergence sulfonylurea herbicide for weed control in corn.

This product can be applied at low-use rates and fits nicely into integrated pest management systems and conservation tillage programs. Farmers can wait until weeds emerge to decide if treatment is needed. Because it is foliar-applied, ACCENT results in even less environmental impact.

Discovering the right chemical is only part of the answer, however. Du Pont's environmental stewardship principles require that we go beyond discovery to the application and safe use of products. Our development and education efforts are aimed at eliminating dust, splashing, and drift problems; developing packaging that is biodegradable, recyclable, reusable or disposable in an environmentally sound way; and ensuring on-target application.

To date, we have had success in all these areas. However, much more research is needed if we are to fully achieve our goals. For example, we have formulated a sulfonylurea herbicide tablet that is about the size of a quarter and is contained in a blister pack. This product meets customer needs for convenience and safe handling, fail-safe dosing, avoidance of accidental spills, and disposal of used packaging. By the way, just one tablet treats one acre.

We have developed water soluble bags where the entire bag can be added to the spray tank, thereby, reducing the potential for worker exposure. And we have introduced container recycling projects where containers are collected, processed and made into blow molded jugs for reuse.

We are also trying to help farmers by developing diagnostic tools that will allow them to identify disease problems in the field. This means that

growers can determine disease levels earlier and make better decisions about if and when to treat with fungicides. Our first diagnostic kit for detection of cereal eye spot was successfully introduced in Europe this year.

Yet, we do not believe that chemistry alone will lead us to a sustainable agriculture. We and other agrichemical companies are investing heavily in biotechnology to produce: crops with insect and disease resistant characteristics; Insecticidal Virus Products (IVP) to provide growers with safe, effective, and environmentally compatible products for Integrated Pest Management (IPM) programs; new manufacturing processes for Bt insecticides to improve their effectiveness in controlling insects in fruit, vegetable, and cotton crops, as well as in soybeans and alfalfa; and specially developed new grains that provide increased margins for farmers by adding value to animal feed and consumer oils.

At the beginning of my talk, I said that partnership is vital if we are to achieve a sustainable agriculture. I'd like to give you three examples of successful partnerships that are leading to better use of science and technology and can impact the development of good public policy.

Two years ago, we developed the "Environmental Respect Award." This is the first national program that not only recognizes agricultural dealers for operating their business in a way that preserves and protects the environment, but also establishes new higher standards for storing and handling pesticides. This year we selected one national and ten regional winners from hundreds of dealers around the country.

This year, we began the No-Till Neighbors Program that provides a forum for farmers to teach other farmers about residue management and conservation tillage practices. Thousands of farmers participate in field days and receive valuable information about tillage methods that provide better water and soil conservation. Our partners in this effort are the Soil Conservation Service, extension agents, dealers, farmers, and grower associations.

Our latest effort is at Remington Farms on the eastern shore of Maryland. There we are launching, with the USDA, EPA and several research and environmental institutions, an on-farm research, demonstration and

education project in sustainable agriculture. Four different cropping systems will be compared over a five-to-ten year period to provide

important data on economics, productivity and environmental impact. These systems represent a wide spectrum of farming practices that use a range of pest management systems. Our partners in this effort represent very diverse points of view about sustainable agriculture, and it is our belief that this process will teach us not only what farming systems work best, but also how we can work together better.

Our experiences with science and technology and with partnering have given me a very positive feeling about sustainable agriculture. The feeling is one of hope. Yes, we acknowledge that there are complexities in achieving a sustainable agriculture that balances economics and environmentalism. But we have a vision that by combining our science and technology with nature's gifts, we can exceed today's knowledge of what is possible and contribute to a continuous improvement in the quality of life.

Yet, we can only succeed in partnership with the other stakeholders in our agricultural system, all of us working together for the common good of agriculture, society, and the world at large.

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Outlook '93

For Release: Wednesday, December 2, 1992

QUALITY OF LIFE ISSUES AND SUSTAINABLE AGRICULTURE

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Quality of life is the most elusive and most important aspect of sustainable agriculture -- or any other production process. It is important that we include it when considering moving to a more environmentally sound agriculture that is also economically viable. Quality of life involves social structures, social groups, and individuals. It requires us to develop complex understandings of social, technical, and biological phenomena. If we can do this for production agriculture, we can provide a model for other industrial sectors as well.

We must remind ourselves that the reason we see it even appropriate to address quality of life issues regarding agriculture is because it is the one industry in the United States still partially controlled by independent producers. Once production becomes completely industrialized, the myth of technological determinism and market perfection becomes so strong that the industry is assumed to be self-driven, with internal rules and relationships so deterministic external impacts cannot be considered. In other industrial sectors in the United States, such thinking as led to focus on maximizing a single outcome variable: short term profits, to the detriment not only of our environment and the quality of life of our workers, but to the detriment of our international competitiveness as well. In Europe, multiple indicators of success are required to be optimized. These include such quality of life variables as employment and, increasingly, the environment. Those industries are able to maintain long term sustainability of profitability better than many industries that are intent on maximizing the single indicator of quarterly profit. It is my hope that what we are willing to do related to small scale independent producers in the agricultural sector will be a harbinger of considerations for other industrial sectors -- not as a mechanism of state control, but as a new paradigm for private sector planning.

Quality of life related to sustainable agriculture is not just the summation of the levels of contentment of farm family members. Just as a farm is not simply the sum of its fields, but the product of the interaction among the various enterprises in which the

production unit -- whether an individual, a farm family, or a corporation -- in engaged, so too quality of life is the product of the interactions among producers, the input networks on which they depend, and the output networks which distribute their products -- and their by-products, including non-point pollution. Understanding the interaction between moving toward a more sustainable agriculture and increasing the quality of life involves a focus on human values -- and on economic and political power. Both are involved, and both have to be taken into account. Values and power determine what is defined as quality of life by whom.

It is conceivable that quality of life in a sustainable production system could be defined as a highly profitable corporate farm that minimizes toxic inputs and insures that few of those that are used reach surface or ground water or permeate the soil. The soil could be maintained and enriched, and the few permanent employees on the highly mechanized unit could be well-paid and content. But unless we consider the implications for rural community, we can become extremely enthusiastic about "environmentally benign" corporate farms, as they are easier to regulate and monitor. We need to consider

the community, defined as decline in interactions among people in the locality. Corporate farm operators are much less likely to buy locally than smaller, locally owned production units, reducing local commercial interactions. And as a result of their control of the major means of production in agriculture areas, there are many fewer farm residents to interact with to address local problems and affirm local identity,

the distribution of power at the local level, as unequally distributed resources are much more likely to lead to sharply differentiated class structures with little hope of social mobility for the many on bottom, while the few on the top seek to maintain their privilege through protecting their opportunities for private consumption through minimizing local collective investment in such things as schools and health care facilities, and

the increasing control of access to processing and markets. Unless one is integrated into vertical networks, it is impossible to produce a product different from that required or with characteristics that deviate from the stringent requirements of the processor.

Quality of life considerations involve first looking at the farm as an integrated system, to see the impact of changing technologies on the members of the household in terms of their time, the resource streams within the household, the health of household members, and the ability of each household member to control over their own labor. We must confront the myth of the farm household as a tightly integrated unit, where decisions are made and executed

in harmony for the good of the whole. We must understand the patriarchal nature of agrarianism and seek technology that maximizes household cooperation, rather than vesting power in an individual household head. Looking within the household means respecting gendered income streams and gendered labor -- and the infinite variety that can be present in a given community -- and the fact that those differences have impact on the technology that can be adopted and the effect of that technology on environment and economic viability of the farm. For example, understanding the household division of labor by season allows the introduction of diverse enterprises (a risk reduction strategy) that can optimize the options of each family member within the household unit. Too many bachelor farmers means that women's needs are not being taken into account in the farming system. Is the work of women valued and do women have choices? Or is women's off-farm income gladly integrated into the farm accounts, with no voice into farm decision making? Another implication of unsustainability of farming is the aging of farmers -- which is also an indicator of patriarchal farm structure. Does the farming system include a place for young farmers? Is the farming system organized in such a way that the young farmer is allowed to drive the tractor before Dad is in his 80s and so crippled up with arthritis that he can't climb into the cab? Is the farm diversified enough so that responsibility can be shifted and shared among generations in way that enhances the dignity of all family members, regardless of age or sex.

Next, quality of life considerations must widen the system focus to the watershed or region. This is a larger perspective than the local community. No longer do people live, work, learn, worship, shop, and socialize in the same limited geographic area. Is the farming system such that such interactions are enhanced or are they hampered by inequalities and lack of access to the important institutions that enhance human potential? As technologies develop, the constituencies that keep them in place develop as well. As more sustainable technologies become common, the constituencies of the old technologies need to be converted or coopted. Change means that there are winners and losers. Even when an old system had a lot more losers than the new one, it is important that the needs of losers are addressed and their options enhanced as well.

Quality of life considerations mean that we specifically address issues of how local and regional power structures limit what technology can be implemented and how new technology concentrates or distributes power. Do fewer people make more decisions regarding the schools, the community, and the economy? Or is participation widened to include all the stakeholders in the process?

The next area where quality of life considerations are important take the power and participation variables to yet another level. What are policies and economic structures that constrain what can

be produced and how it can be produced? And what new policies and structures will be necessary for more sustainable practices to be put into place? Very often it is difficult to get operating credit from traditional lenders, particularly rural banks, for more diversified operations and less input use. In fact, agricultural loans in general are harder to get. Quality of life considerations allow us to consider alternative institutions and policies which facilitate more environmentally benign policies and institutions which also enhance participation and increase the number of beneficiaries.

In sum, quality of life opens a wide gamut of consideration far beyond crop rotations and nutrient management. But if more sustainable crop rotations and nutrient management systems are to be introduced and adopted, quality of life considerations must be taken into account. Quality of life goes beyond farm family and community, the warm and fuzzy part of rural values, to economic structure and policies -- the power relations that have large impacts on our lives. Quality of life considerations allow us to directly address these issues, from the kind of research we do and how it is chosen to who has the opportunity to adopt the technology and whether they can remain on the land once they adopt a more environmentally sound practice. Quality of life considerations are indeed vague. But as we specify them and attempt to measure them, by adopting a systems approach that relates what happens on the field to what happens on the farm, through the community and region to the major state and national players, we get a complete picture of the food system and how it affects the lives of all of us. And if we sketch this picture for agriculture and realize that we have choices that link technology, power, and values, we can do so for other industrial sectors as well. The point is not social engineering, but realization that we do collectively have choices about the kind of world we live in.

Outlook '93, Session 27

For Release: Wednesday, December 2, 1992

OUTLOOK FOR U.S. AQUACULTURE

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Agriculture's changing horizon is the theme for this year's outlook conference. This theme accurately describes the transformation some sectors of the aquaculture industry are now undergoing as they change from emerging industries whose primary focus was on improving production techniques to larger more mature industries dealing with marketing problems such as new product development, food safety, distribution, and brand recognition. This changing focus will not impact all the sectors of the aquaculture industry evenly. Some sectors are still in the developmental stages where overcoming basic production problems is the primary concern. However, for some aquaculture species, such as catfish and hybrid striped bass production has risen to a point where it has a major market impact and it has outgrown the niche markets that spurred its original development.

The overall outlook for the U.S. aquaculture industry in 1993 is for continued expansion of its total output and total value, and for an increase in the number of species actively being grown. Some of the forces behind this expansion are the continued depletion of many wild stocks and the falling real prices of many aquaculture products. This does not mean that all aquaculture operations will be successful. While the production of some species will expand rapidly in 1993, others may suffer setbacks as rapid changes both domestically and abroad will continue to present challenges to growers and processors.

Specifically, the forecast for 1993 domestic catfish production is for little or no increase, while trout production is expected to grow. Production of other food fish is forecast to rise next year and new species should come into production. Output from domestic shellfish operations in 1993 are predicted to be close that of 1992, but the forecast for mollusk production is for continued expansion.

The majority of aquaculture production was originally targeted at the higher priced end of the seafood market. The potential of high market prices was a chief incentive for growers to begin to culture new species. During the 1980's as seafood consumption was rising and world aquaculture production was expanding rapidly, many growers aimed their production at the "white tablecloth restaurant" market and its equivalent spot in "gourmet" retail markets. With the domestic economy expanding this marketing strategy for the most part worked very well. Two prime examples of this are the large growth in imports of farm-raised salmon and shrimp.

However, as we head into 1993 the economic conditions are much different. With much slower economic growth and a more uncertain economic future, the numbers of consumers dining in expensive restaurants and purchasing high cost seafood has fallen considerably. Consumers are looking carefully at ways to maximize the value of their purchases. High quality is still a major selling point for seafood products, but it must be combined with reasonable prices.

Under these changed conditions aquaculture producers must seek the optimum way to position their products within the seafood market. They want a market

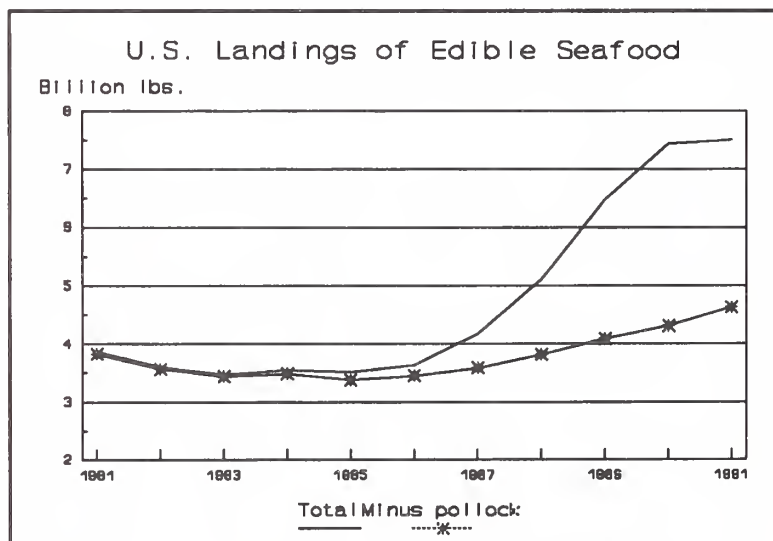
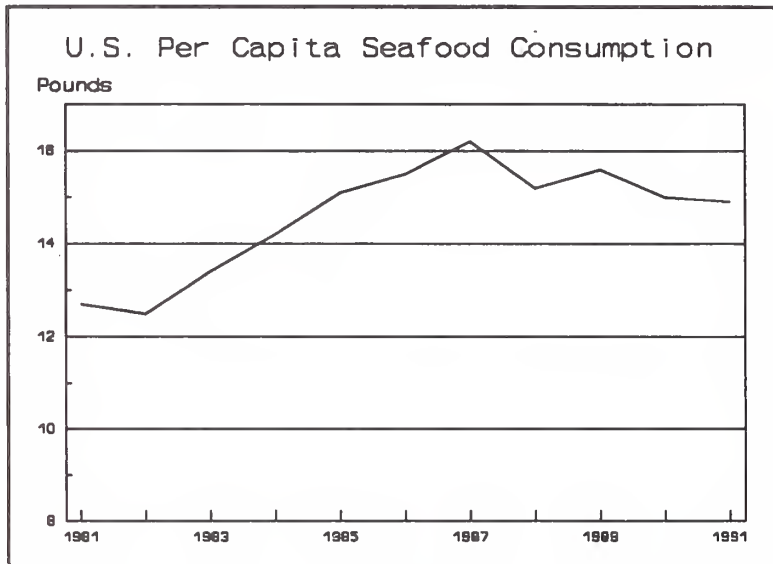
price low enough to expand the demand for their product, but at the same time they do not want their products appeal to be based solely on price. One factor adding to the complexity of these decisions is that many aquaculture species have a number of close substitutes.

Seafood Consumption Falls in 1991

Per capita consumption of seafood in the United States has fallen from its peak of 16.2 pounds in 1987 to 14.9 pounds in 1991, a decrease of 8 percent. However, even as the per capita consumption of all seafood was declining consumption of farm-raised seafood products has been growing. Three examples of this are shrimp, salmon, and catfish. Since 1987, the quantity of imported shrimp, much of which is farm-raised, has grown 15 percent and salmon imports, also largely farm-raised, are up 156 percent. Domestic catfish processors have seen their sales rise 36 percent since 1987. This means aquaculture products

as a percentage of total per capita seafood consumption have increased. One factor behind the increase is that over this time period their real prices have generally fallen. In contrast, the real price for many wild-caught seafood products has gone up or not fallen nearly as much.

The ability of aquaculture growers or processors to continue to incorporate new cost-reducing methods into their operations will be a critical aspect in the future growth of aquaculture. Many wild-catch fisherman are facing either a diminishing resource base and/or growing harvesting restrictions. The end result of these problems could be an increase in per unit harvesting costs. If these divergent trends for the prices of farm-raised and wild-caught products continues, over time farm-raised products will continue to become more competitive economically with wild-caught seafood.



Domestic Wild-Caught Growth Over?

One of the chief factors behind the aquaculture development of many fresh water species was the realization that wild-caught harvests could not continue to supply the market. This situation may now also be true with many marine species. Over the last six years the wild harvest in the United States has

grown tremendously, but it was almost solely the result of the explosive growth in the harvest of one species, Alaska pollock, not the growing harvest of a number of species. In the future, pollock should not have as large an impact on U.S. landings as their landings have probably reached their peak. Without pollock, U.S. wild-catch landings would have risen from 4.0 billion pounds in 1981 to 4.6 billion pounds in 1991. Even then it took exceptionally large harvests of flounder and crabs in 1991 to achieve this level. For the ten year period this is an annual growth rate of about 1.5 percent, just barely above population growth. This seems to bode especially well for growth in marine aquaculture. However, the domestic marine aquaculture industry has a number of technical and environmental concerns such as bottom fouling and genetic impacts on wild stocks that must be overcome before large scale marine aquaculture can occur for species other than salmon.

Catfish

Little Growth Seen in 1993

In 1993, catfish production is forecast to show little or no growth after expanding 15 to 17 percent in 1992.

While production is not expected to show much growth, the forecast is for substantially stronger farm-level catfish prices in 1993. The increase in farm level prices will be the result of lower available supplies of market-size fish. The reduction in available supplies comes because growers have reduced inventories in response to the low prices that have prevailed during roughly the last 18 months. While farm level prices are expected to increase in 1993, the

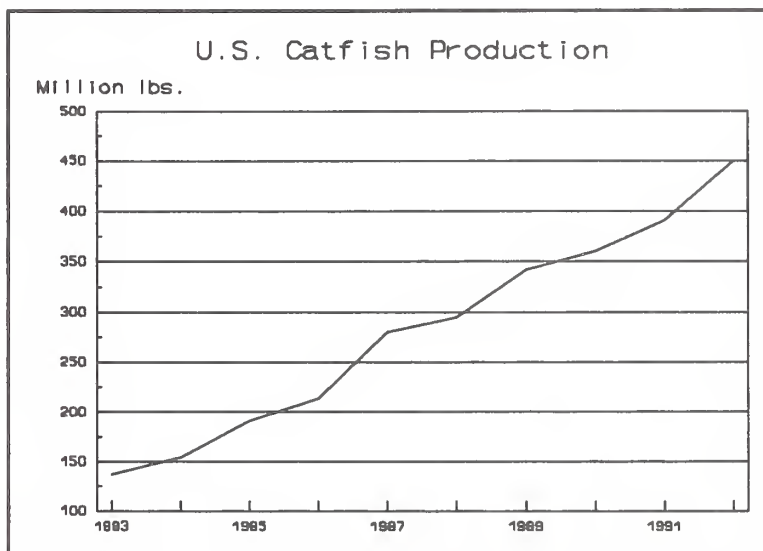
ability of processors to raise prices may be limited by the general state of the economy.

Grower Inventories Down

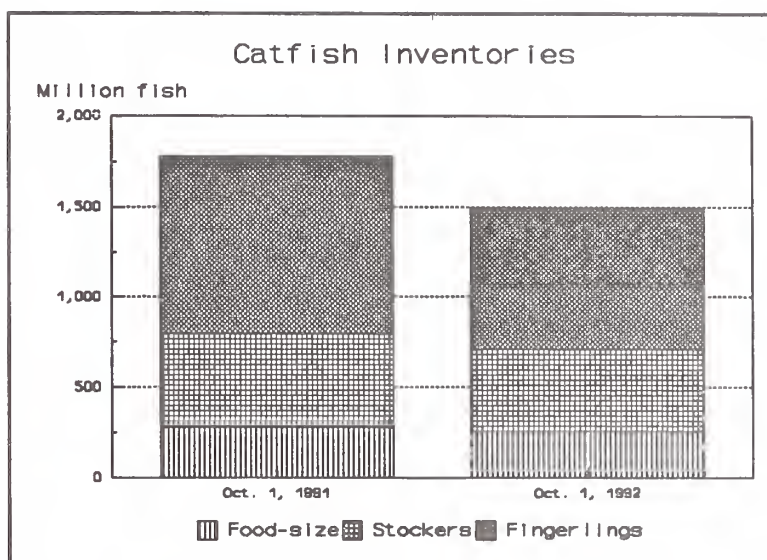
Central to the 1993 catfish production forecast is grower estimates of their inventory holding as of October 1 and their inventory/stocking decisions for the 4th quarter. These estimates when compared to those of a year earlier gives a picture of what level of supplies will be available to processors during the coming year. The October 1 inventory estimates were compiled for Mississippi, Alabama, Arkansas, and Louisiana, which accounted for 95 percent of production in 1991. The report showed that stocks of all food-size fish were down 8 percent from the previous year. Inventories of stockers (both large and small) and fingerlings were down 13 and 20 percent. These inventory figures indicate that not only will there be a tightening of supplies during the first part of the 1993, but that this tight supply situation should persist for most of the year.

Looking only at inventories the forecast for 1993 would likely be for little or no growth. However, a factor in 1993 production will be the stockers and fingerlings placed in ponds during the fourth quarter. These fish will not effect available supplies in the first half of 1993, but they could impact sales in the second half of the year.

Over the first three quarters of 1992, catfish growers in the four major



producing states placed considerably smaller number of stockers and fingerlings into their ponds. Compared to the same period in 1991, placements of large stockers were down 14 percent, small stockers were off 20 percent, and fingerlings were off 13 percent. One item to note, however, is that during the third quarter, growers reported stocking more heavily than the previous year. This may be because in 1991 farm prices were already falling rapidly, while this summer growers may have already been anticipating stronger prices in the coming months.



There are a number of other questions that make the output forecast less certain for 1993. First, how fast will the stockers and fingerlings reach market size? As of October 1, growers reported that they had 235 million large stockers in their ponds. These fish averaged .46 pounds. They need to about double in size to be ready for processing. How fast they do this will be largely a function of the weather during the fourth quarter of 1992 and the first quarter of 1993. Second, what will the mortality rate be for the stockers and fingerlings currently in inventory? As of October 1, growers held 451 million stockers and 783 million fingerlings in inventory. Third, as farm prices fell many growers cut feeding to maintenance levels. If prices rise how fast will growers respond with higher feeding rates?

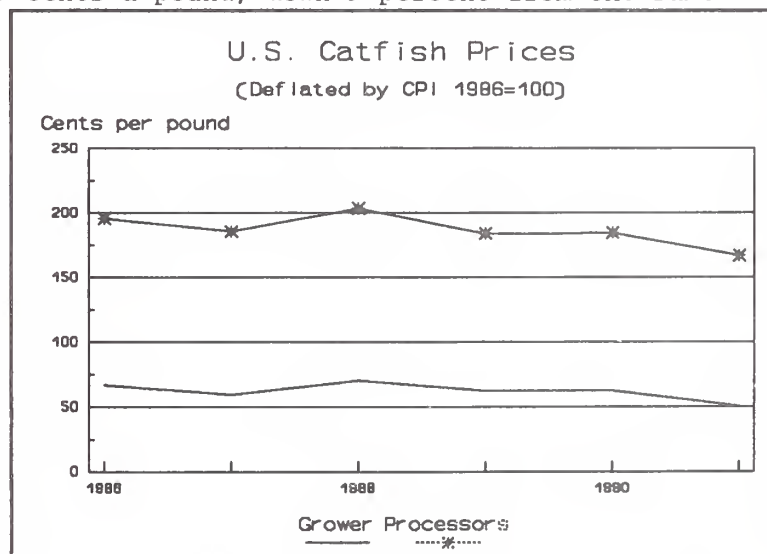
1992 Sales Expected to Reach 450 Million Pounds

During January - September 1992, 350 million pounds of catfish were processed, up 19 percent from the same time the previous year. The 1992 total should be 450 - 460 million pounds. This would be an increase of 15-17 percent from 1991. During the first nine months of 1992 the average price of catfish delivered to processors was 59 cents a pound, down 9 percent from the same period the previous year.

This resulted in total farmer revenue being 8 percent higher than for the same period the previous year. The increase in total revenue, however, hides the fact that 59 cents per pound is below production costs for almost all growers. While total revenues may have been up, grower profits were likely down.

Real Catfish Prices Continue to Fall

Between 1986 and 1991, the real price of catfish has trended downward at both the grower and the processor levels. This decrease in real prices has continued in 1992 and is expected to continue over the long term. Falling real prices should occur in response to higher grower and processor productivity.



Increased efficiency for growers will likely come from such factors as faster growing fish, better disease treatments, more effective aeration strategies, and more control over off-flavor problems. Higher productivity for catfish processors can be expected to come from increasing mechanization, increasing edible meat yields, capturing economies of scale, or improving distribution.

Long-term falling real prices can be most accurately documented for the catfish industry, but should be included in the outlook for many other aquaculture products. As the different aquaculture sectors grow, the combination of more competition from new firms entering the industry and technical innovations will help to increase productivity and lower grower prices for many species.

Trout

Trout Production to Rebound

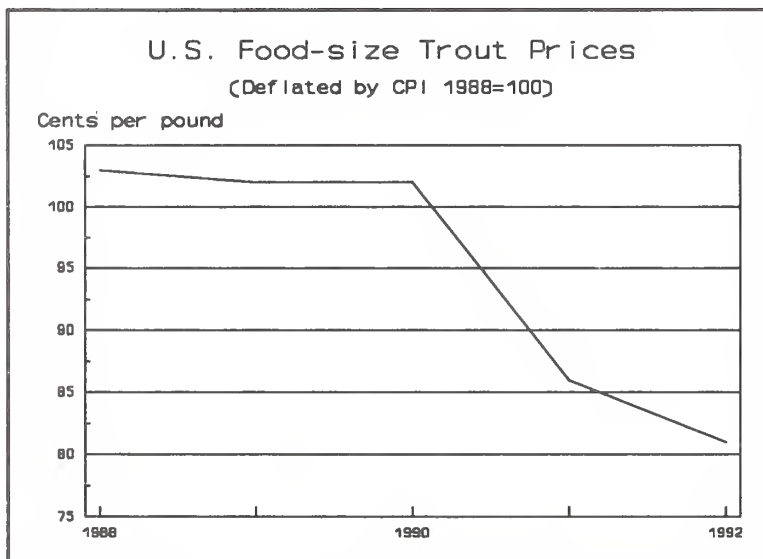
Trout production is the oldest sector of U.S. aquaculture industry. As such it is probably the most "mature" of the aquaculture industries. Over the last five years production of foodsize trout has remained basically flat, going from 56.0 million pounds in 1988 to 56.3 million pounds in 1992. One obstacle hampering the expansion of the trout industry is the fairly restrictive water quality and temperature requirements of this species. There are very few available production sites that combine the water temperatures and water quality needed for trout production. Even at sites with the correct water temperature and quality, there is rarely a sufficient water volume available to allow producers a large enough operation to capture all the possible economies of scale. Because of these restraints, the only means to expand production for many growers is through the installation of expensive water reuse and oxygen injection systems.

Over the last five years declining nominal and real prices has made trout a more competitive product in the marketplace. However, these falling prices have made it difficult for established growers to finance expansions or for new growers to enter the business.

Outlook for Trout

While overall trout production has been generally flat over the last several years, there have been wide fluctuations in production at the State level. Many of these fluctuations are the result of adverse weather conditions, such as flooding in places like Virginia and North Carolina, and drought problems in many Western States, such as California, Utah, and Idaho.

For 1993, trout production will likely increase from the levels posted in 1992. However, forecasting trout industry production is difficult, because even though sales figures are reported in four different size groups of fish, growers do not report inventory figures. Inventory figures are needed to make informed forecast because many of the largest trout producers are vertically integrated controlling production from hatchery through final processing. Simply examining reported sales figures overlooks fingerlings and stockers produced by firms for their own use. One sales figure to look at is egg



sales. Many smaller trout growers, when they are replacing stock, purchase eggs as opposed to fingerlings or stockers. In 1992, sales of eggs were up 45 percent to 453 million. This would indicate that trout growers are aiming to expand their production because not only was the number of eggs sold up sharply, prices were also higher.

Outlook for Other Finfish

One forecast for 1993 that can be made with a high degree of certainty is that during the next year

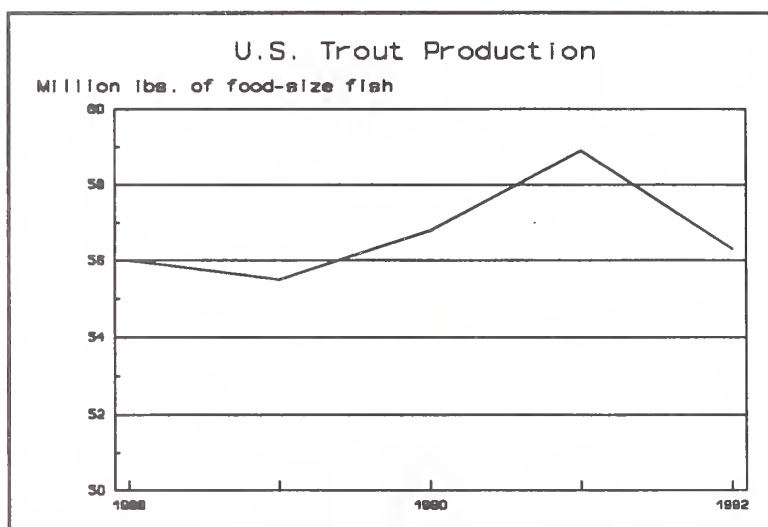
additional species will begin the first stages of aquaculture development that leads to commercial production. Researchers and growers are currently examining the possibility of commercially growing such marine species as halibut, flounder, and cod. Interest in farming these species is due to two factors. First, depressed wild-stock levels and growing harvesting restrictions in many areas points toward long-term supply shortages. Second, many of the growers experimenting with farming small amounts of different marine species are salmon farmers and they are interested in having more than one species available as a cushion against fluctuations in salmon prices.

While attention may be drawn to attempts to culture new species, much of the growth in aquaculture in 1993 may come from a trio of species that are reaching significant levels of production. The hybrid striped bass (HSB), tilapia, and domestic salmon industries have all grown rapidly in the last several years. Each of these species faced a different set of problems that will affect their future market conditions.

The culture of HSB is basically a domestic industry, 1992 production is estimated at between 6 and 8 million pounds, with almost no imports or exports. The one unpredictable factor in their demand is the level and timing of the wild striped bass harvest. At the present time, farm-raised production is probably larger than the commercial wild striped bass harvest. However, the commercial wild harvest season tends to be fairly concentrated in the winter months and sales are at prices well below those of farm-raised HSB. This effectively shuts HSB out of the market for most of the time when wild striped bass are available.

There are a number of factors that should work in favor of the continued growth of HSB. First, HSB producers have an advantage in being able to offer product throughout the year. For many food service establishments, the relatively steady supply and prices available from HSB growers could be a critical factor in whether to use this species or not. Second, some states are studying the possible effects of declaring striped bass a game fish and preventing any commercial harvest. This would benefit HSB growers by lowering commercial supply and allowing them to market their production throughout the entire year, and receive a steadier price. Third, the techniques for growing HSB bass are still rapidly evolving. As growers expand their operations some economies of scale should become evident. These trends should help to reduce production costs, which will in turn both expand the market for HSB and allow it to compete more effectively with other species.

The market for tilapia is different than for HSB. The largest uncertainty facing domestic tilapia producers is what impact imported tilapia products



will have on the domestic market. Presently, our knowledge of the tilapia market is only fragmentary. Import data specifically on tilapia products only became available in July of this year. The first three months of import data show that 3.5 million pounds of tilapia entered the country between July 1, and September 30. The products had a wide range of prices depending on the supplier and the product form. For this small sample of data, Colombia was the major supplier, with Costa Rica, Taiwan, and Israel also exporting tilapia products to the United States.

U.S. tilapia growers will probably have higher production costs than growers in many of the countries they are competing against. Domestic tilapia growers therefore must carefully market their products, looking for areas with less competition or they must develop a product that can command a higher price. One possible area is the live fish market, targeting mostly Asian populations in metropolitan areas. A second possible market might be upscale restaurants or fish stores, or even large grocery chains willing to pay slightly more for high quality product. Tilapia, like catfish, can suffer from off-flavor problems. If domestic producers can guarantee a top quality product plus a competitive price there will likely be some growth potential.

Much of the long-term future for tilapia production in the United States rests on how successful growers and researchers are at developing cost competitive and effective water recirculation systems. Because of the high temperature requirements of tilapia, production without water recirculation systems would restrict the location of production facilities to a very small number of areas in the South. Great strides continue to be made in increasing the effectiveness of water recirculation systems, but their long-term cost competitiveness with pond culture systems has not yet been proven with food fish.

Salmon is the third U.S. fish species that has undergone rapid growth in the last several years. It also faces a different competitive environment. First, domestic farm-raised production is overshadowed by a very large and valuable wild catch industry. Second, domestic production is only a small part of world farm-raised salmon output. Third, it is the only species of the three to use a marine environment.

With present technology, the temperature requirements of salmon, plus the environmental requirements of growout sites, and legal restrictions in some areas, combine to severely limit the long-term growth of the domestic industry. However, many growers are still in the early stages of production and have room to expand their operations.

With a decline in Norwegian salmon production over the past year, prices have improved lending a better outlook for the farmed salmon industry. However, farmed salmon competes with other species at the high end of the seafood market so the continuing downturn in the domestic economy presents a problem with reduced consumer demand.

Since domestic salmon production is small relative to world production and labor and other business costs are higher than in, say a country like Chile, U.S. growers will probably never be the lowest cost producers in the industry. It will therefore be necessary for domestic growers to fully utilize any advantages they have over competitors, such as delivery speed from producer to marketer. Also, they must produce a high quality product and have the flexibility to develop new products to meet the changing needs of their buyers.

Shellfish

The forecast for the domestic shellfish industry in 1993 is for output to generally continue at the same levels as the previous year. In the domestic aquaculture industry there are only two shellfish sectors of any size. Those are the shrimp and crawfish industries.

One future bright spot for the U.S. shrimp sector may be in the production of disease-free broodstock and not in the production of shrimp for the food market. In many areas of the world shrimp farming has grown rapidly and the shrimp populations have become infected with an number of viruses. While these viruses may be present in wild populations without causing much damage, in the more stressful conditions of a growout pond the effects of the diseases are magnified. If production of certified disease-free broodstock can be developed, it would provide growers concentrating on food production with shrimp better suited for the increasingly intensive nature of shrimp culture.

Crawfish production for the 1991/92 crop year in Louisiana was estimated at 58 million pounds. Acreage in ponds is expected to be roughly the same for the 1992/93 crop, but poundage is forecast to be down somewhat, due to the effects of Hurricane Andrew. Andrew was expected to have the largest impact on the young crawfish that had been born during the summer, by lowering water quality in ponds. This should result in harvesting being down in the early months of the season, November and December. Harvesting volumes are expected to pickup later in the season.

Efforts by the crawfish industry to increase exports seem to be bearing fruit as the quantity of exports over the first nine months of 1992 were XX percent higher than the previous year. While export prices were also better than the previous year, crawfish prices in the domestic market were about the same as the previous year. Future expansion in exports will depend on a combination of factors such as exchange rates, the domestic economy, and what supplies are available from other producing nations. One country that may heavily influence the future direction of the industry is China, which is a large crawfish producer and who has begun exporting processed meat to the U.S.

As in other areas of the aquaculture industry shellfish growers are examining the possibilities of culturing different species. Most of these would be non-native species and would have to be grown chiefly in indoor operations. Some possible candidates for production are different species of Australian freshwater lobsters. There are three species being looked at, each with its own advantages and disadvantages. On a size basis they would fit in between crawfish and lobsters. California has already approved the production of one species of Australian crawfish. However, because it is not a native species, the production will be in an indoor system that would minimize any chance of accidental escape.

Mollusks

The outlook for domestic mollusk aquaculture continues to be clouded by safety questions about the consumption of raw products. The concerns with mollusk safety are twofold. First, mollusks are filter-feeders, and as such they tend to concentrate any contaminants that may be present in the water in their flesh. Second, most mollusks are grown in coastal waters and bays, the very areas that are most likely to be affected by pollutants. In general the public's concern with obtaining safe seafood products may give aquaculture producers somewhat of an advantage. Mollusk producers especially must be able to explain to consumers the benefits of their product, that they are constantly present at the growout site and that they regularly monitor water conditions.

One possible method that producers are looking at to assure product quality is depurating all mollusks before selling them to the public. However, depuration can only rid mollusks of certain pollutants. Another unresolved question is whether the public is willing to pay a premium price to cover the extra cost of the depuration process.

Overall the outlook for mollusk production in 1993 is for continued expansion of production as the output of new firms and new species should overcome any reductions in other areas. However, mollusk growers even more so than with

other aquaculture operations will have to pay strict attention to quality control and develop efficient water monitoring programs.

FDA'S SEAFOOD INSPECTION PROGRAM

by

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Food and Drug Administration

at the

Agriculture Outlook '93
USDA's 69th Annual Outlook Conference

December 1 - 3, 1992

Washington, DC

It is a pleasure to be here today. I appreciate the opportunity to tell you about the Food and Drug Administration's activities with regard to seafood. First, I will give you an overview of the agency's responsibilities, with a bit of an update on our regulatory activities; and then I want to talk more specifically about FDA's view of aquaculture products.

Seafood has become much more important in the United States, both in terms of its role in the diet and its contribution to the Gross National Product. Consumption is now 15 pounds per capita, and the industry has set a goal of 20 pounds by the year 2000. As a result, consumers, public health officials, the Congress, the media and scientific organizations are taking long looks at the efforts of both the seafood industry and the government with respect to assuring the safety, wholesomeness and proper labeling.

Over the last three years, Congress has held hearings and introduced legislation to change the way in which seafood is regulated. Although no legislation has been signed into law, FDA has been given an expanded budget for seafood inspection, research and education activities - a total of \$38.5 million this year. In addition, the Office of Seafood was established to coordinate all FDA activities.

Now, when I say seafood, I mean all fish and fish products, including finfish, crustaceans, and molluscan shellfish, both wild harvested and farmed, marine as well as fresh water, imported and domestic. FDA's statutory responsibility is to assure the safety, wholesomeness, and proper labeling of all these products. Let me now go over some of our activities in the last year or so to meet this mandate. As I mentioned earlier, our activities center on inspection and enforcement, research, education and training.

INSPECTIONS

Last year, we conducted a survey of the domestic seafood processing industry to update our Official Establishment Inventory (OEI), and to get a better view of the industry. Approximately 3,000 firms were inspected, including about 350 firms that handle aquaculture species.

As a follow-up to this limited GMP survey, we recently carried out more in depth inspections of producers of selected higher public health risk products. These included cooked-ready-to-eat products; products in modified atmosphere packaging; products from scombroid species, including tuna, mackerel, mahi mahi and bluefish; and certain specialty products such as stuffed and breaded items. We have begun compiling the extensive inspectional observations collected at each plant.

The information gleaned from these inspections will help us in targeting of future inspection strategies and frequencies, based upon a better understanding of the latest industry practices. Meanwhile, we have increased our inspection frequencies of the higher risk firms to at least annually.

HACCP

A longer term goal is to incorporate HACCP principles into all our seafood inspections. HACCP, or Hazard Analysis Critical Control Point, provides industry with an important processing control tool to prevent problems from ever reaching consumers. FDA benefits in that our inspectors can audit the pertinent processors' records made during the continuous monitoring of critical control points, and therefore have more than just a snapshot of the operation. The ultimate beneficiary, we believe, will be the consumer.

FDA/NOAA VOLUNTARY SEAFOOD PROGRAM

Beyond the changes to strengthen our mandatory inspection and enforcement program, we have been working with the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA/NMFS) in developing a voluntary, HACCP-based inspection program that will serve as an adjunct to the FDA mandatory program and the NOAA voluntary program already in existence. We hope to implement the program on or about January 1, 1993. It will be voluntary, fee-for-service. We conducted pilots for domestic and foreign processors, and for retail, and are finalizing our Federal Register notice of proposed rulemaking, announcing the availability of the program.

IMPORTS

Imported seafood constitutes about 55% of the seafood consumed in the U.S. It is important that these products are safe and wholesome and properly labeled. We are informed by U.S. Customs of all product entering our parts, some 180,000 shipments in 1991! We have established a new import strategy that includes: Closer cooperation with state and local agencies in order to identify imports that reach the retail market; the initiation of civil and criminal judicial actions against importers who flagrantly violate FDA regulations; short term targeted inspection surveys of specific product categories; and education. At the same time, importers must do a better job - they must be more responsible to make sure the product they bring here meets our requirements.

In addition, we are pursuing a new strategy for Memoranda of Understanding (MOUs) with foreign countries. Instead of pursuing agreements only with countries that continually have problems, we intend to seek agreements with countries that historically have done a good job. I call these the "Good Guy

MOUs". This new philosophy will facilitate the entry of product from the countries that consistently export safe, wholesome, properly labeled products, eventually permitting us to concentrate our resources on the bad guys. During this fiscal year, we intend to pursue MOUs with Iceland, Canada, Australia, New Zealand, and Norway.

ECONOMIC FRAUD

In a 1991 speech, Commissioner David Kessler stated, "There is no place in the seafood industry for those who substitute a less expensive or less desirable specie of fish for one that consumers value more. We will seek out those who perpetrate fraud - and we will bring them to justice". He received a standing ovation from the seafood industry. Their enthusiasm was not in vain. I am pleased that over the last year we have taken a much stronger stand against economic fraud. Our budget for this area has been doubled, and we are seeing increasing compliance in certain problem areas as a result.

From our office alone, we have sent over 1,000 letters warning the industry. Our Field offices added to this by sending their own warning letters on regional issues. As described in the recent article in the New York Times, we have taken a number of actions against species substitution, including rockfish for red snapper; Pollock for cod; fresh water fish for salt water; and Oreo dory for Orange roughy. And we intend to continue to vigorously pursue action against this and other types of economic fraud described in the article.

PHOSPHATES AND SCALLOPS

Available data indicate that scallops naturally consist of about 75 - 79% water when harvested. After processing, however, depending upon the treatment, they can lose a considerable amount of moisture rather quickly. STP, which is Generally

Recognized As Safe (GRAS), can be used, and legally so, to prevent moisture loss, or "drip loss" in scallops. Unfortunately, prolonged soaking in STP solutions results in scallops taking up excessive water, adding to the overall weight of the product. This water being sold at the price of scallops constitutes economic fraud. In extreme cases, scallops can be soaked for so long that the product becomes badly decomposed.

We indicated over a year ago our concerns regarding the misuse of phosphates and the illegal inclusion of added water in scallops. Follow-up activities, included meetings with the concerned industry, inspections, warning letters and appropriate follow-up regulatory efforts.

In August, the agency announced a new interim labeling policy for scallops in response to a proposal from the industry.

INTERIM LABELING POLICY

We have agreed to the interim labeling policy for six months while additional research data is provided by industry. Scallops that have been treated with STP and have picked up water must be labeled with the identity statement of "X % Water Added Scallop Product". This labeling must be used with any scallop with 80 to 84 percent water. In addition, the statement "Processed with Sodium Tripolyphosphate" or any other polyphosphate that is used, must appear on the label. The ingredients statement, too, must indicate that water, STP or other phosphates have been added. No scallops containing greater than 84% moisture will be permitted. In other words, untreated scallops consisting of 79% water or less are to be labeled scallops. Any product consisting of 80 to 84% moisture should be labeled as a scallop product and anything over 84% cannot be marketed.

We have instructed our field offices to actively pursue the examination, sampling and analysis of scallops, both imported and domestic. We are taking action against product found not to be in compliance with the interim policy and will continue to do so until a final policy is established.

In the meantime, academic scientists are developing data to determine the effects of various STP concentrations and soak times, and whether STP soaking has functional benefits to consumers beyond the prevention of drip loss. In addition, data are being developed to determine the effect of the various treatments on key nutrients.

BLUE CRAB

FDA has a Compliance Policy Guide which states that product labeled as "crabmeat", with no qualification, must be derived from the blue crab, Callinectes sapidus. Recently, we received a formal complaint from the domestic crab industry about imported crabmeat from other species which is being substituted for and labeled as crabmeat, with no regard for FDA's policy and requirements. Also being disregarded are the U. S. Customs Service's country of origin requirements. We have this under investigation and are working with the industry and other concerned agencies at the Federal and State level to solve the problem.

DUNGENESS CRAB

Recently, the agency became aware of the incidence of domoic acid in Dungeness crab viscera from the Pacific Northwest. Domoic acid is a biotoxin which causes Amnesic Shellfish Poisoning. This is significant because many people eat part or all of the crab viscera. This problem is in addition to concerns about saxitoxins which cause Paralytic Shellfish Poisoning, or PSP, which also has shown up in the same area and Alaska as

well. We have issued notices to State regulatory agencies through our National Regional-State Telecommunications Exchange System (NRSTEN). Letters have been sent to the affected industry as well. The notices explain our regulatory position on the incidence of domoic acid and saxitoxins in the viscera of cooked Dungeness crab. FDA is taking regulatory action against Dungeness crab in interstate commerce that is found to have 20 ppm or more of domoic acid in the viscera, as well as Dungeness crab that is found to have 80 μg per 100 grams or more of saxitoxins in the viscera.

This action is in response to several events, and new information available to the agency, with respect to PSP.

Canadian authorities have recently closed harvesting areas near Quatsino Sound of Vancouver Island. Alaska too has issued an advisory to consumers and to their industry, recommending evisceration of affected crab. We support these efforts, as well as encouraging the affected states to put in place monitoring and closure systems modeled after the very successful PSP monitoring system for molluscan shellfish.

PARASITES

In an effort to modernize our Compliance Policy Guides, we have issued an assignment to our Districts to sample and analyze various finfish for parasites. This is an on-going project and will enable us to evaluate industry practices for the control of parasites in fish products. In June, we received an interim report from the Industry Task Force on Parasites in Fish. While we appreciate the cooperation and effort, this report was disappointing. We hope the final report will be more conclusive.

The information gleaned from the task force, both our own and NOAA's inspectional and analytical efforts, current international standards, as well as a thorough search of the

literature, will all be used to develop GMP parasite tolerance levels on a species group basis. The first groups to be addressed will be the gadids and the flounders. Then other species groups will be considered.

CHEMICAL CONTAMINANTS

There continues to be public concern about chemical contaminants in seafood. Certainly, FDA is always being asked to make a judgment on the public health significance of contaminants in both freshwater and marine species. We've taken a number of steps in an effort to provide such guidance and to gather new information.

We have completed development of guidance documents on five contaminants found in molluscan shellfish - cadmium, lead, nickel, arsenic and chromium. These are designed to provide relevant scientific information to state and local regulatory personnel, who can then evaluate the public health significance of local and regional contamination, and issue appropriate public advisories or initiate closures of effected state-regulated harvesting waters. These documents are under review by an AFDO subcommittee on fish contaminants and will be available soon. We are developing more such documents on other contaminants in the meantime.

We are also hosting a two-day conference on chemical contaminants in seafood early next year in Washington, D.C. The purpose of the conference is to explore the knowns and unknowns about chemical contaminants, and to assist FDA in determining the kinds of monitoring and research that are still needed. I hope some of you will plan to attend this meeting and assist us in determining where we need to go from here.

LISTERIA

Listeria in seafood is a difficult problem. Currently, our policy is that if we detect it, we take action. The Canadians have a different strategy that seems to be working in which the firms must adhere to strict government GMPs which absolutely minimize the occurrence of listeria in ready-to-eat products. On this basis, it is not necessary for them to routinely monitor listeria in end products. We plan to further explore the Canadian approach to listeria in seafoods.

DECOMPOSITION

We have been putting a lot of effort into the area of decomposition, trying to improve the consistent detection of decomp that occurs through both organoleptic and chemical indicators. The use of new chemical indicators, to supplement organoleptic testing, are proving to work well. There remain variations, though, and we are finding that the relative levels of chemical indicators and the rates of decomposition are highly variable and related to the different categories of seafood.

We are putting together a plan and schedule for this area to include the establishment by notice of a 50 ppm defect action level for histamine in all fresh and frozen scombridae fish; a 1 ppm cadaverine defect action level for mahi mahi, tuna and other fishery products; and the implementation of a new PASS/FAIL system for assessing statistically taken samples. Those are just some of the highlights.

IRRADIATION OF SEAFOOD

The possible irradiation of seafood to reduce pathogenic or decomposition organisms offers considerable promise. This is a safe, scientifically sound technology that is cleared for use in about 35 countries. If properly used, it can give the consumer

a higher quality product, as well as a safer product in terms of harmful microorganisms. An editorial in the September/October issue of Public Health Reports says, "Food irradiation can be compared with pasteurization in its promise for the public health. Not only does the technology extend the shelf life of produce by inhibiting ripening or sprouting, it kills or renders noninfective many harmful food-borne organisms." The editorial goes on to cite the incidence of various *Vibrio* species of bacteria in seafood, making the point that irradiation would go a long way in solving these problems. In addition, the use of irradiation will give industry greater flexibility in terms of available species and distribution channels, and will help balance international supply and demand. Two petitions are currently under review in the Agency to permit the application of this technology to fishery products. If approved, it is clear there will need to be greater consumer education to achieve acceptance and understanding. Industry and government must work together to establish appropriate safeguards to prevent misuse of the technology and public understanding.

AQUACULTURE

Although it is a relatively young industry in this country, aquaculture production has almost quadrupled, in both dollar value and poundage since 1980. We estimate that the value of U.S. aquaculture products is about \$760 million, accounting for about 10% of the U.S. Seafood supply. Over 3,400 aquaculture farms raise catfish, crawfish, trout, salmon, clams, mussels, and oysters. It is estimated that by 1995, these U.S. farmers will grow one billion pounds of fish and shellfish. There is no doubt that the industry is already making a significant contribution to the economy and the seafood supply.

We in the Office of Seafood share responsibility for aquaculture products with our sister Center for Veterinary Medicine (CVM), located in Rockville, MD. CVM is responsible for reviewing and approving any drugs that are used in aquaculture products. The Office of Seafood is responsible for assuring the safety and proper labeling of these products as human food. We are interested in what drugs, chemicals and feed additives are used in farm-raised product, and then we are interested in whether these ingredients leave harmful residues in the edible product. Now, let me tell you more specifically about our aquaculture activities.

The Center for Veterinary Medicine has identified a number of chemicals of both high and low priority for regulatory action. Included among the high priority drugs are chloramphenicol, malachite green and nitrofurans, among others.

DRUG RESIDUES

In response to information that some overseas producers of shrimp are using the antibiotic chloramphenicol in their product, the agency undertook the development of an analytical method to test for this drug in shrimp. Chloramphenicol was chosen because it is prohibited from use in the U.S. in food producing animals, due to a serious health concern over exposure to any residues in food. So far, we have found 3 samples out of 60 to contain chloramphenicol. We targeted shrimp from countries with major shrimp aquaculture operations and selected species most likely to be farm raised. A shipment from China contained 30 ppb and two shipments from Thailand also contained the drug. These shipments, with a total wholesale value of over \$130,000 were, of course, refused entry.

As a result of these findings, we are asking our field investigators to continue their sample testing and we are expanding this to include domestic product as well.

We have just asked our field offices to test imported salmon for oxolinic acid, with emphasis on the larger salmon producers - Norway, Canada, Great Britain and Chile. This program will be expanded to include domestically raised salmon as well.

Our researchers are working to develop similar methods for detecting residues of malachite green, nitrofurazone, oxytetracycline and a number of other drugs.

In addition, CVM is holding a number of Investigational New Animal Drug (INAD) workshops across the country. These are designed to provide for an exchange between the Center and individuals involved in the gathering of data needed for the approval of new animal drugs. Our intent is to facilitate this process. CVM is also working with USDA's Interregional Research Project No. 4 (IR-4) to facilitate approvals of drugs for use in aquaculture.

COLOR ADDITIVES

An issue that has been a bit of a sticky wicket has to do with the use of color additives in aquacultured fish.

Canthaxanthin use is approved for coloring food and for coloring chicken feed under FDA regulations. At the time that these regulations were passed, it was not the agency's intent to include permitting the use of this color additive in fish feed, although we did not explicitly prohibit it. This ambiguity has led to a lot of confusion in the industry AND in the agency. We are drafting a Federal Register notice which will clarify our position. Pending publication of the FR notice, industry may use canthaxanthin as long as the product is properly labeled as

having this color added. The industry just recently submitted a petition to obtain approval for such use.

In addition, a petition was submitted sometime ago for the use of synthetic astaxanthin in fish feed. Neither natural nor synthetic astaxanthin are approved for use in animal feed or human food at this time. We are still reviewing new data submitted by them a few weeks ago.

FDA SEAFOOD HOTLINE

Last, but certainly not least is the initiation of the FDA Seafood Hotline on October 1, 1992. This too has been long in coming, but is an important part of our comprehensive educational program designed to enlighten the public about the safety of the seafood supply. The Hotline number is 1-800-FDA-4010, or in the Washington, DC area, 205-4314.

The Hotline is available 24 hours a day through a computerized information retrieval system that permits callers with touchtone phones to request FDA seafood publications, listen to pre-recorded seafood safety messages and access other information. Information can even be FLASHFAXED using this system. In addition, between 10 am and 2 pm, Eastern Time, Monday through Friday, FDA Consumer Affairs Specialists are available to answer questions directly and to return earlier calls requiring personal attention. Since the Hotline began officially, we are already averaging over 25 calls per day. The first six months will be considered a pilot. We will be receiving rather extensive reports that will include information on the numbers of questions asked, the topics and publications requested. This will help us immensely in targeting future consumer information activities and subjects.

To wrap things up, FDA has a comprehensive program addressing problems with seafood safety, wholesomeness and

labeling. Given what is on our plate and all the things we are doing, I believe we are making good progress and decisions on how to deal with the problems. We recognize we can't do this alone and appreciate the support and cooperation of other Federal, state and local agencies, as well as the industry itself. Together, we can earn the complete confidence of consumers.

Outlook '93

For Release: Wednesday, December 2, 1992

AQUACULTURE MARKETING

Larry W. Cope
President & CEO, Clear Springs Foods, Inc., Buhl, Idaho

Thank you for inviting me to speak with you today regarding a subject that has been a focus of my attention for nearly twenty years. I come to you today, not as an expert in marketing; but as a practitioner operating one company in an emerging industry that has somehow been successful in introducing an aquacultured product to a national market. Today, in the few minutes available, I will attempt to identify who we are as an industry, define our market as I see it and how we approach that market. In conclusion I will discuss a few issues that I believe are particularly important to the aquaculture industry that will need to be resolved if we are to be as successful in the future as I believe we can be.

To begin, lets attempt to identify the U.S. aquaculture industry. The makeup of the industry includes a variety of fin fish, mollusks and crustaceans raised and marketed as food products. The major fin fish currently cultured and marketed include catfish, rainbow trout, hybrid striped bass, tilapia and salmon. Mollusks are, for the most part, comprised of clams, oysters and mussels. The crustacean production is generally comprised of crawfish and shrimp. The industry is generally located throughout the U.S. with the heaviest concentrations being the catfish industry in the south, the trout industry in Idaho and the salmon industry concentrated in Washington and Maine.

The ownership makeup of the participants of the U.S. aquaculture industry varies greatly from the smaller family owned farming operation to the larger investor owned vertically integrated companies. It seems that most corporate ownership comes from companies choosing to purchase live products from family owned operations, then process and market the products under national brand names. Few corporate structures have been successful operating at the farm level. In my view, in the future the successful aquaculture ventures at the farm level will most likely be entrepreneurial driven operations. Major companies in the food industry will most likely only find their success at the processing and marketing end of the business.

programs of the major catfish processors. My company, Clear Springs, also stands as an example of an individual company that has been successful in developing a viable national market for a branded aquaculture product and many other aquaculture companies producing salmon, oysters, mussels, etc. can also be recognized for their successful market entries. Although the general seafood market is very complex and ever changing, market entry by aquaculturists should not be a barrier to achieving success in the aquaculture industry. Normally failures will come from the basic economics of the production side of the business or the new entrant's failure to recognize the need to adequately invest in effective sales and marketing programs.

Appropriate government policies can serve to assist the aquaculture industry in achieving future success. The industry has a need for appropriate environmental protection of the resources it uses in the production process and, in turn, the industry has a duty to be good environmental stewards of the resources used for production. Additionally, to assure consumer confidence in products being produced by aquaculturists as well as all seafood producers, the industry continues to ask for appropriate mandatory seafood inspection at the national level. Until the inspection issue is resolved at the national level and all products, either produced domestically or imported, are subjected to appropriate inspection, the industry will continue to be subjected to negative press regarding food safety issues.

Although market entry and market development is a challenge for aquaculturists it should not be viewed as a constraint to the development of a viable aquaculture business. Market development is a primary ingredient to the success of any business. Today, seafood consumption, at approximately 15 pounds per capita, represents only about 6% of meat protein consumption in the U.S. The aquaculture industry today is producing more than 10% of the seafood products being consumed. Clearly the market will allow for substantial growth of the U.S. aquaculture industry in the future. Success will come to those producers operating from a sound economic and technical base that are willing to commit to the market in the future.

Thank you.

Outlook '93

For Release: Wednesday, December 2, 1992

"U.S. SWEETENERS MARKET--RECENT DEVELOPMENTS AND OUTLOOK"

Peter J. Buzzanell
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Introduction

Ladies and gentlemen, it is both a pleasure and a privilege to represent the U.S. Department of Agriculture in addressing the Sweeteners Session of Outlook '93. My colleagues and I welcome you to Washington, D.C. As public servants our office doors are always open and I encourage you to come and talk to us about issues that concern you. For my part, I have made a special effort over the last year to meet you at your places of work around the country. Whether it was in a cane field in Louisiana, a beet processing plant in Colorado, a candy factory in New Jersey, or a trading desk in Manhattan, I always encounter people who are well informed on a broad range of issues, who ask tough questions of me as a representative of USDA, and who are also willing to provide thoughtful responses to my questions.

One set of market questions I have asked repeatedly centers on identifying emerging trends and practices in the various subsets of the U.S. sweetener industry. Another set has sought to solicit what the future goals are for farms, factories, and marketing enterprises and what strategies will be employed to achieve those goals. A third set has sought to extract those underlying concerns about potential pitfalls that could make the stated goals unreachable.

In this Outlook '93 presentation on the U.S. sweetener market, I would like to share with you my qualitative distillation of responses to these questions. USDA, Census, and industry statistics provide the necessary quantitative framework.

U.S. Sugar Production

USDA forecasts fiscal 1992/93 sugar production at a record 7.6 million short tons, raw value, 4.1 percent higher than last year's record outturn. These back-to-back record crops--the highest since 1975/76--have been achieved despite two hurricanes that reduced the production potential of cane sugar crops in Louisiana and Hawaii this season, and unusually warm weather last winter that led to sugar losses in piled beets last season (Figure 1, Table 1).

Beet Sugar

U.S. beet sugar production for 1992/93 is forecast at a near record 4.2 million tons, raw value, or 55 percent of the national total (Figure 2). Some private sector analysts believe actual beet sugar production for the year could top 4.3 million. The underpinnings for this near record or record beet sugar crop are impressive. Area harvested is estimated at 1.41 million acres--the highest since the mid-1970's--yields in the field are good, and sucrose content is high (Table 2 and 3).

Sugarbeet harvested area has grown significantly in many parts of the U.S. over the last decade. In simplest terms, the growth can be tied to expanded capacity of beet factories, relatively weak prices of alternative crops, and the relative price stability and financial liquidity provided by USDA's loan program. Across the nation's growing areas the numbers are impressive--Idaho is up 64,000 acres over the last decade, Michigan is up 77,000 acres, and Minnesota is up over 100,000 (Figure 3 and 4). In Texas this spring, one beet company had many more farmers who wanted to grow beets than they could accommodate. In southern Minnesota, the cooperative plans to increase acreage about 15 percent next spring. Again and again around the country, I have been told sugarbeets, while not cheap, nor easy to grow--especially in the early stages of the crop cycle--provide a dependable source of income as a rotation crop.

Fostering growth in acreage has been an impressive expansion in beet slicing and refining capacity. While no U.S. new beet factories have been built over the last decade, there has been an impressive investment in expanding and upgrading the efficiencies of many of the nation's beet processing plants (Figure 5). Total slicing capacity is up 9 percent from a decade ago, despite the closing of 6 beet plants in the early 1980's. Average daily slicing capacity per plant is up 27 percent. This growth has been particularly noticeable among the beet cooperatives of the Red River Valley and southern Minnesota and for those beet processing companies around the country that have merged with other segments of the sweetener industry here and abroad.

In addition to the impressive growth in slicing capacity, 5 beet processors have installed "state of the art" ion exclusion technology to extract more sucrose from beet molasses. USDA estimates that during 1992/93 a total of 250,000 tons of beet sugar is likely to be produced at these facilities. Heretofore, most of this would have been lost to molasses.

This enhanced capability not only results in more sugar to market, but also improved utilization levels of plant and equipment--some of these plants now run over 300 days a year, more than doubling the use days of fixed assets (Figure 6).

Hand-in-hand with the upward trends in acreage harvested and greater factory capacity, has been the efforts to improve beet quality and reduce post-harvest losses. While tonnage advances are still important, the focus has been on increasing sucrose content in beets and improving the capability to extract that sucrose. There is a whole array of technologies and practices being employed that seek that end--soil and petiole testing, improved seeds (e.g. better in vigor, disease resistance, yield potential), planting to stand and heightened plant population levels per acre, heightened awareness of optional management of nitrogen and its impact on sucrose, and earlier maturing varieties. With relatively good growing conditions this season, America's sugarbeet growers are harvesting a crop that shows just how well they can do. For example, in parts of the Great Plains where I recently visited, there are many farmers who can boast they are producing over 20 tons of beets per acre with over 20 percent sugar--an exclusive "20-20 Club."

One high-tech example of reducing post-harvest losses is the common use of aerial infrared photos to detect hot spots. These hot spots where losses can occur are pulled for immediate processing.

Where are these trends headed? California provides an example of both the pitfalls and promise that may lie ahead (Figure 7). Acreage in the State is down this year by over 31 percent from the decade high 216,000 in 1987. In mid-October, one Central California beet processing firm filed bankruptcy papers to facilitate restructuring its debt. The era of plentiful low-cost water and electricity is apparently over. Urbanization is bidding up land prices and in some areas more remunerative crops are taking land from beets. The future of California beet agriculture also is heavily dependent upon progress in combating diseases such as rhizomania and virus yellows.

California has endured 6 years of drought. With changes in Federal and state water policy, sugarbeet agriculture's claim to water availability is changing. A shift to less thirsty crops is one solution.

These challenges mirror what is happening in other parts of the country, particularly in western growing areas. Water for irrigation is also an issue in some parts of Idaho/Oregon, in western Nebraska, and elsewhere. Diseases are also a problem--curly top reduced yields from this year's crop in Idaho and rhizomania has been found for the first time in some areas of the Great Plains and in Idaho.

But the industry has considerable adaptability and technical know-how to meet these challenges. Quick action in developing seed resistant to lettuce infectious yellows saved the industry in the California Imperial Valley the early 1980's. As a result, sugarbeet

agriculture is now flourishing in the Imperial Valley on the border with Mexico. The recent expansion of beet acreage in the high elevations of California-Oregon's Klamath Basin provides another adaption to changing conditions further south. Nevertheless, the water issue in the west will likely call for increasing adaptations and new strategies to sustain beet volume and quality advances.

Cane Sugar

The story for U.S. cane sugar is just as noteworthy. USDA forecasts fiscal 1992/93 production at 3.4 million tons, raw value, second only to last season's record--despite losses from Hurricane Andrew that hit Louisiana and damage from Hurricane Iniki on Hawaii's island of Kauai (Figure 8, Map 1). Nationally, yields are off at 32.6 tons per acre due to weather--the record was 38.4 tons in 1986/87--but sucrose recovery rates and sugar per acre again are likely to approach 12 percent and 4.0 tons, respectively (Table 4). In contrast to beet sugar, the situation and outlook is much more varied in the individual cane producing states.

Florida--Barring a significant freeze this winter, Florida is again expected to produce a cane sugar crop approaching 1.8 million tons--the third 1.8 million ton crop in a row (Figure 9). Florida has taken a quantum leap in its production potential from the 1.3 million ton annual average in the 1980's. Besides good growing conditions, improved yields in the field and better sugar content have been fostered by a well-established breeding program funded by the industry, the State of Florida, and USDA.

Its area in sugarcane for 1992/93 is a record 450,000 acres, mostly concentrated in Florida's Everglades Agricultural Area (EAA), south of Lake Okeechobee. Florida's sugarcane growers, now accounting for nearly 50 percent of total national cane acreage, did not reach the 400,000 planted-acre mark until 1986/87. Increases in acreage in recent years, reflect successive planting of cane instead of fallow or alternative uses.

This expansion in sugarcane production is linked to some of the world largest, most efficient cane mills. Grinding capacity has increased over 21 percent during the last decade (Table 5). In addition, the industry annually undertakes substantial reinvestment to improve processing efficiencies and lower costs. For example, during the past two years, the Sugarcane Growers Cooperative of Florida has undertaken a major capital investment project which almost doubled its crystallizer capacity and thereby increases the potential recovery of sugar in each ton of cane milled.

Florida, long heavily dependent on offshore labor to harvest cane on the region's soft muck soils, is now rapidly moving toward near total mechanization. New machines can now operate more efficiently on muck soils, improved cane varieties stand more upright, and management, through annual incremental moves toward mechanization, has improved through experience and adaptations. In the mill, new equipment has paved the way for these changes.

Will Florida's cane sugar production continue to trend up? Florida appears to have the capacity to produce 2.0 million tons in the near future--through incremental increases in area, yields, and mill capacity. Florida seems to be solving the H-2A labor issue, for which it has been so publicly criticized, through mechanization and a cooperative approach to the critics. However, other issues loom on the horizon such as environmental challenges concerning water quality and water flow, especially with heightened public concern about maintaining the viability of the unique ecology of the Everglades located to the south of the sugar production area.

Apart from the environmental issues--which if they go against the industry could force acreage out of cane production--higher production levels are likely to strain the infrastructure to market sugar. However, this bottleneck could be solved by increased investment in storage facilities at mills, greater dependence on rail transportation to move sugar out of Florida, or expansion of storage and loading capacity at the Port of Palm Beach.

Louisiana--USDA's 1992/93 pre-Hurricane Andrew sugar production forecast for Louisiana was a record 1.0 million tons. This forecast was based on a record 390,000 harvested acres of which 364,000 were to be used for sugar and 26,000 for seed cane to plant next year's crop. Good growing conditions last winter, spring, and summer, indicated yields at 26.0 tons per acre, 18 percent above the previous year. However, these bright prospects were shattered by Hurricane Andrew which slammed into the heart of Louisiana's sugarcane growing area last August 26th.

The Louisiana-based American Sugar Cane League's post-hurricane assessment was sugar losses of about 20-25 percent. Among the 20 sugarcane parishes in the State, the loss estimates ranged from a low of 10 percent in the fringe areas of the hurricane to over 50 percent where the eye of the storm passed, including several of the largest producing areas--Iberia, Iberville, St. Mary, and St. Martin parishes (Map 1).

As of our November 10, WASDE report, USDA estimates this year's sugar production at 850,000 tons (Figure 10). This assessment reflects somewhat more tonnage available for grinding and improved sucrose levels compared to assessments taken immediately after the hurricane.

I came away from my recent trip to Louisiana with a strong impression of the resiliency of both the cane crop and Louisiana growers. The industry had experienced a devastating freeze in December 1989,¹ and now a powerful hurricane. I mentioned acreage is at a record level. This growth in part reflects a return to sugar by growers who switched from sugar to alternative crops such as soybeans in the late 1970's and early 1980's. Higher acreage has been facilitated by expansion in milling capacity by 40 percent over the last decade and average mill size (Figures 11 and 11a). Some of these mills with expanded capacity are offering growers hauling allowances at harvest, to encourage hauling as far as 90 miles.

On the technical side, I found this oldest of the nation's sugar growing areas to be very progressive. Use of pre-harvest ripeners on cane is wide-spread, as is the use of the dependable, though expensive, two-row harvester. Research is underway at USDA's Houma experiment station to develop cane varieties with increased sucrose and improved cane yields for second ratooning. At Louisiana State University's Audubon Sugar Institute at Baton Rouge, research is underway on desugarization of cane molasses and other important research topics.

Growers also are technically very savvy. While a grower was telling me that his contract with the mill was just a hand shake, at the same time he was receiving his morning computer print-out from a mill messenger. The grower went on to explain to me how his cane is sampled upon delivery using the core/press sampling method and how each morning he receives a print-out of his Theoretical Recoverable Sugar (TRS), Commercial Recoverable Sugar (CRS), and other variables. He then proceeded to interpret for me today's results compared with those of last week, last year, and the long term trends he was seeing on his farm. In his judgement, the core/press sampling method is fair and uniform and gives a grower the confidence that delivering quality cane will be consistently rewarded.

Now all the mills in Louisiana employ the core/press method for the testing and payment of cane. Since the installation of the core/press samplers in Louisiana, there has been a significant improvement in the sugar yield. As Ben Legendre, Sugarcane Research Leader at USDA in Houma has written, the economic incentive (more money per ton of cane) given for quality cane has encouraged even higher quality, since grower returns more than justify the additional expenditures required to achieve this higher quality.

Where is Louisiana industry production headed? At current or slightly higher acreage levels and plant capacities, and using yield and recovery rates for 1987, 1988, and 1989 crops as benchmarks, Louisiana could easily produce 1 to 1.2 million tons per year, absent adverse weather. However, farmers have huge debts--especially those who have recently returned to cane production--that threaten their survivability in adverse times.

Lastly, the general consensus around the state was that they still had too many small mills. Today there are 20 mills, twenty years ago there were twice as many, but perhaps only 10-12 large efficient mills might be needed in the future.

Hawaii--USDA's estimate for Hawaii's sugar production for fiscal 1992/93 is 675,000 tons, which would represent the smallest outturn since 1922/23. In the mid-1980's Hawaii was regularly producing 1.0 million ton sugar crops (Figure 12). What has happened? Excessively wet weather adversely affected production in recent years particularly on the Hamakua coast of the island of Hawaii. Most recently Hurricane Iniki hit the island of Kauai severely damaging the current crop as well as reducing 1994 production potential. According to the Hawaiian Sugar Planters Association (HSPA), in 1991 Kauai accounted for 29 percent of the State's harvested acreage and 24 percent of production (Map 1).

Hurricane Iniki was only the latest in a series of events to reduce Hawaii's sugar production potential. On July 30, the C. Brewer Company announced the cessation of sugar operations at their Mauna Kea plantation, mainly because of low returns for sugar. Mauna Kea, on the island of Hawaii, is a 15,000-acre plantation producing between 50,000 to 60,000 tons of sugar per year. Planting ceased this November. Since sugarcane is a 2-year crop in Hawaii, harvesting will continue at Mauna Kea through 1994. On August 14, the Hamakua Sugar Company on the Island of Hawaii announced that it had filed for reorganization and protection under Chapter 11 of the Federal Bankruptcy Code. Hamakua is the State's second largest plantation, trailing only Hawaiian Commercial & Sugar (HC&S) on Maui, with over 7,500 acres harvested annually and sugar production exceeding 100,000 tons. While Hamakua is likely to stay in operation, acreage in cane will be reduced. From 1982 to 1992 the number of sugar mills in the State declined from 15 to 12 and the area annually harvested for sugarcane fell by nearly one-fourth from 95,000 to 72,000 acres. Milling capacity has declined overall, and the average daily grinding capacity of the existing mills is the smallest of the four cane producing states.

Not to go unnoticed, HSPA recently announced significant cutbacks in staffing and research at its internationally known Experiment Station at Aiea. The funding cutbacks are attributed to a sharp reduction in matching funds from the State of Hawaii and a decline in funding from Hawaii's sugar companies.

Where is Hawaii's production headed? According to the industry they face high costs on their sugar lands and are aggressively moving to reduce unit costs. The Hawaiian industry also has aggressively sought to develop alternative crops, especially on the islands of Hawaii and Kauai (e.g. coffee, macadamia nuts, and tropical fruit crops). On Kauai, Hurricane Iniki did severe damage to these new crops. On Oahu, pressure for urbanization is likely to intensify and long-term leases on much of the land on Oahu in sugar are up for renegotiation, and some may leave sugar.

To quote James Andrasilk, Vice Chairman of HSPA speaking at the annual meeting of the Hawaiian Sugar Technologists in Honolulu on November 16. "Low raw sugar prices have intensified the cost-price squeeze Hawaii's sugar companies have had to endure because of lower yields and productivity the last few years.... We expect that annual raw sugar production will stabilize somewhere around 500,000 to 600,000 tons."

Also adapting to change has been the C&H (California and Hawaiian) refinery at Crockett, California. According to Ray Knecht, Vice-President-Refinery Operations, speaking at the HSPA meeting, C&H has sought to maximize economies of scale by purchasing foreign raws to make up for less raw sugar from the islands. It would appear C&H will process increased volumes of foreign raws in the future.

Texas--Keep your eyes on Texas. While it will likely remain the smallest cane sugar producing state, some very positive things are happening. USDA expects a record 1.24

million tons of cane to be produced in 1992/93. Sugar production this year and last year is at the 110-115,000 ton level, compared with an annual average of 89,000 tons during the 1980's, a 27 percent increase. Texas cane growers have been very active using in lazer land leveling for better water distribution, planting improved varieties on more productive fields, reducing nitrogen levels, timing nitrogen applications better, expanding acreage of high-sugar, early-maturing varieties, and adjusting roller size in the factory to extract more juice while maintaining throughput.

The outlook is for incremental growth as acreage expands somewhat to about 42,000 acres and production rises to 135-145,000 tons annually. As always, cane production in the Texas lower Rio Grande Valley will be vulnerable to extended rains during the processing season and periodic freezes.

Sugar Consumption

For 1992/93, U.S. sugar consumption is forecast at 9.0 million short tons, raw value, up 125,000 tons or 1.4 percent from the revised estimate for the current year (Figure 13). The consumption forecast includes 8.91 million tons of sugar deliveries for domestic food and beverage use, 80,000 tons of re-export transfers to manufacturers of sugar-containing products for export, and 10,000 tons to manufacturers of polyhydric alcohol for domestic use (Table 6).

U.S. sugar consumption this year may reach its highest level since 1982. After several years of decline, due largely to the substitution of high fructose corn syrup (HFCS), sugar deliveries rebounded in 1987. Annual consumption growth over the past 6 fiscal years averaged 180,000 tons per year. The resurgence reflects both population and income growth, and heightened demand for sugar in commercially prepared foods and packaged sugar for the grocery trade and institutional users. Per capita refined sugar use is forecast at 64.7 pounds for 1993, up 3.1 pounds since 1987.

Underpinning sugar's performance in volume terms--reflecting its various functional characteristics in addition to sweetness--is growth in demand from industrial users, especially the bakery and cereal and confectionery industries. In fact, USDA's statistics may be undercounting this demand. Industrial users tell me that they are increasingly buying sugar from re-sellers -- a growth trend we are trying to learn more about (Figure 14).

Where is sugar use headed? I would first like to recommend your scanning the paper we have provided "Seven Trends Driving U.S. Food Demand" by Jean Kensey of the University of Minnesota. It places U.S. demand trends for food in a broad context. For sugar, USDA foresees continued slow annual consumption growth. We do not foresee a massive wave of substitution of sugar by new products--such as crystalline fructose or high intensity sweeteners.

From my recent field trips, I was impressed by the broad based emphasis on "quality" as well as volume advances in sugar marketing. Refined sugar manufacturers are seeking to improve the "quality" of their product lines -- to produce that improved sugar product that will give them an edge in the market place. This is coupled with "quality" of service--not only "just-in-time delivery" but meeting more rigorous specifications from sugar users. One senior executive told me, that quality and service were equally as important as price in maintaining his customer base and expanding market share. While I can't quantify it, perhaps this "quality" effort is already paying dividends in terms of incremental growth in total sugar use.

Sugar Trade

The U.S. remains a large net sugar importer. USDA set the tariff rate quota for 1992/93 at 1.36 million short tons (1.23 million metric) (Figure 15). Owing to our premium price, we expect most of the quota to be filled. Last year we had a small shortfall and this year we foresee a 30,000 ton shortfall or about 2 percent of the quota allocation. For example, Zimbabwe will be unable to deliver its quota of 15,000 short tons because of a drought which devastated their crop (Table 6).

On the export side, the current forecast is 590,000 tons, largely based on re-exports of refined sugar under USDA's re-export programs and shipments to Puerto Rico. During the last 4 fiscal years re-exports averaged over 550,000 tons a year and were very helpful in maintaining U.S. raw cane refinery capacity.

On August 27, USDA announced marketing allotments for domestic sugar would not be established during the first quarter of fiscal 1993. This determination was based on an estimate that sugar imports for consumption for fiscal 1993 will exceed the 1.25-million-short-ton trigger level for establishing marketing allotments under 1990 Farm Act. Re-estimates of fiscal year import requirements--the Market Allotment Import Estimate (MAIE)--are required to be made quarterly.

It would be highly inappropriate for me to speculate about prospects for triggering marketing allotments. What is clear is that sugar production could rise, as both plant capacity and acreage is available (Figure 16). All in all, it would seem that given current conditions, production potential could advance faster than sugar demand. As always, a late season freeze at beet planting time, drought, hail, water shortages or excesses, and plant diseases during the growing season, freezes at harvest, warm weather causing losses of piled beets, or winter freezes in the cane processing season or hurricanes -- any of these can quickly dash an optimistic production forecast. As a result, a major weather event can prove to be pivotal in shaping Government policy decisions.

High Fructose Corn Syrup (HFCS)

I look forward to our panel on sweetener use -- Don Westfall on sugar, Peter Meyer on corn sweeteners, and Max Downham on high intensity sweeteners. Many of you probably saw the *Wall Street Journal* article on November 5, "Artificial-Sweetener Makers Start Slugging" -- relating the heightened low-calorie tabletop sweetener competition between saccharin and aspartame. Also, we all want to know what Max thinks will happen when the Nutrasweet patent on aspartame goes off December 15, particularly for the diet soft drink market. For my part I would like to close by sharing with you some data on HFCS.

As noted in Figure 17, "Wholesale Prices for Sugar and HFCS", the sugar price umbrella for HFCS remains. With a cost advantage, HFCS has largely captured the soft drink sweetener market from sugar and now appears to be eating away at some of sugar's remaining strongholds. Let me give you our numbers based largely on incomplete industry data and our own internal analysis.

We put HFCS production capacity in calendar 1992 around 8.4 million short tons, dry basis (Figure 18). Adding glucose syrup and dextrose capacity, brings the total to between 11.5 and 13 million short tons. Recent announcements of 2 new wet milling plants to come on line in the mid-west by the mid-1990's would push capacity up to the 12.5 to 14.5 million short ton range.

For 1992, we estimate HFCS production at 6.62 million tons and total use at 6.55 million (Table 8). Per capita use is 51.3 pounds, double what it was a decade ago before the beverage market was captured, but only up incrementally in recent years. Maturity of HFCS demand has meant that growth in recent years has been gradual rather than dramatic. HFCS-42 has been growing faster than HFCS-55 due to its lower price and greater versatility in uses other than beverages (e.g. cereal and bakery, processed foods). However, beverages, mainly soft drinks, still represent over 70 percent of total HFCS domestic use, and over 90 percent of HFCS-55 annual domestic use (Figure 19).

The United States is expected to be a net importer of HFCS in calendar 1992: Imports--virtually all from Canada--are forecast at 185,000 short tons, dry basis, up from 152,000 in 1991. HFCS exports, including shipments to Puerto Rico, are expected to total 120,000 tons, down from 144,000 in 1991. Most of these exports traditionally go to Canada, with a small share in recent years shipped to Mexico.

U.S. soft drink demand is projected to grow slowly in the years to come. According to the U.S. Department of Commerce's most recent *Industrial Outlook* report, the rate of growth in the U.S. soft drink bottling industry is likely to slow somewhat over the next 5 years compared with the levels of the 1980's. Changing lifestyles and purchasing patterns, including demographic shifts toward older consumers, who buy fewer traditional soft drinks, reduce the industry's growth potential. Of particular interest is one new

product group, referred to as "New Age" drinks, intended to appeal to consumers interested in variety and natural products free of additives, artificial ingredients or flavors. This segment includes all natural sodas, sparkling (carbonated) juice drinks, flavored sparkling waters and drinks targeted to athletic participants. These "New Age" soft drinks have grown much more rapidly in recent years than conventional soft drinks and now command about 2 percent of the soft drink market. However, many "New Age" drinks contain somewhat less HFCS than conventional soft drinks. As a result, it does not appear that "New Age" drinks will provide HFCS a substantial boost in use growth.

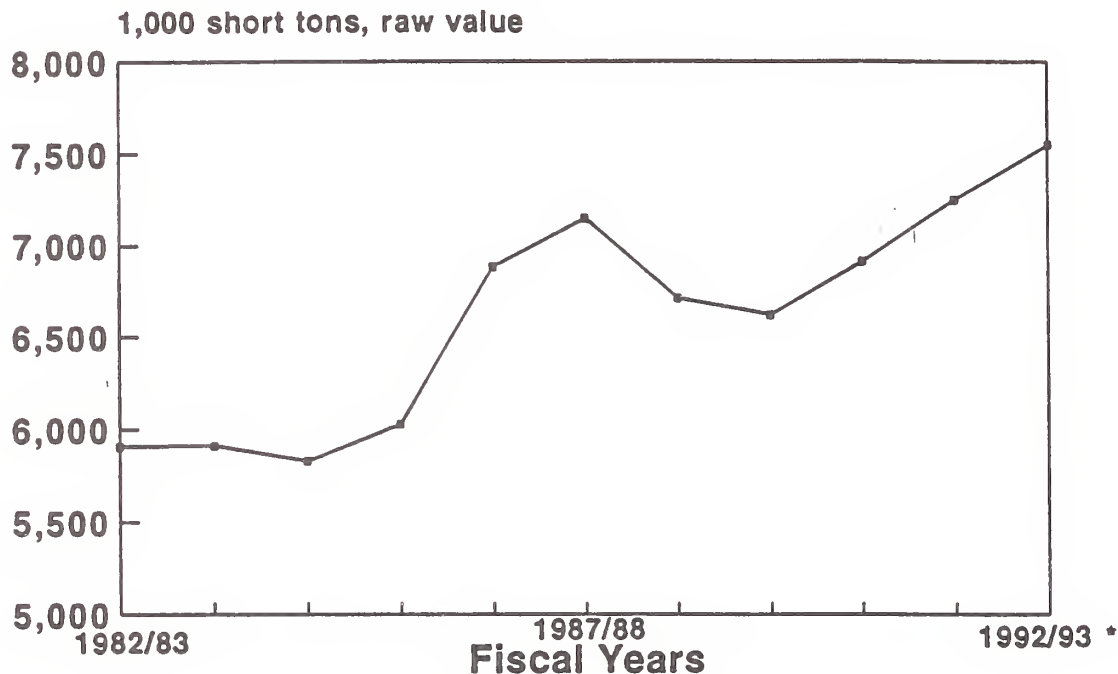
With no major growth spurts likely for HFCS in beverages and non-beverage sugar markets, the U.S. HFCS industry is likely to look increasingly abroad for growth. The flow of HFCS to and from Canada is expected to continue to be related to the Canadian internal sugar price, closely correlated with the world sugar price. When refined sugar prices are low in Canada, more sugar is used there, displacing HFCS, and increasing the flow of HFCS exports to the United States. Conversely, when prices of refined sugar are relatively high in Canada, more Canadian HFCS is used internally, exports shrink, and imports from the U.S. then increase. We do not foresee any substantial changes in the volume or patterns of trade.

What about Mexico, particularly in light of the sugar provision in the North American Free Trade Agreement (NAFTA)? There is likely to be some gradual substitution of HFCS for sugar in the Mexican soft drink industry by the end of the decade. The gradual increase in HFCS use in Mexico would be due to a combination of potential rise in sugar prices in Mexico, and a declining duty on HFCS imports from the U.S. Construction of HFCS plants in Mexico, dependent on U.S. corn is possible, but not probable.

Mexico's geographic population density is important (Map 2). In the heavily populated north near the U.S. border, transportation costs for U.S. HFCS will be lower, and costs of shipping Mexican sugar northward will be higher, so HFCS would be most competitive in the northern part of Mexico. However, in heavily populated central Mexico near Mexico City and the bulk of their domestic sugar production, transportation costs for U.S. HFCS will be higher, and sugar prices lower, so HFCS will likely not be as price competitive--i.e. no sugar price sombrero for HFCS in the southern part of Mexico.

Figure 1

U.S. Sugar Production

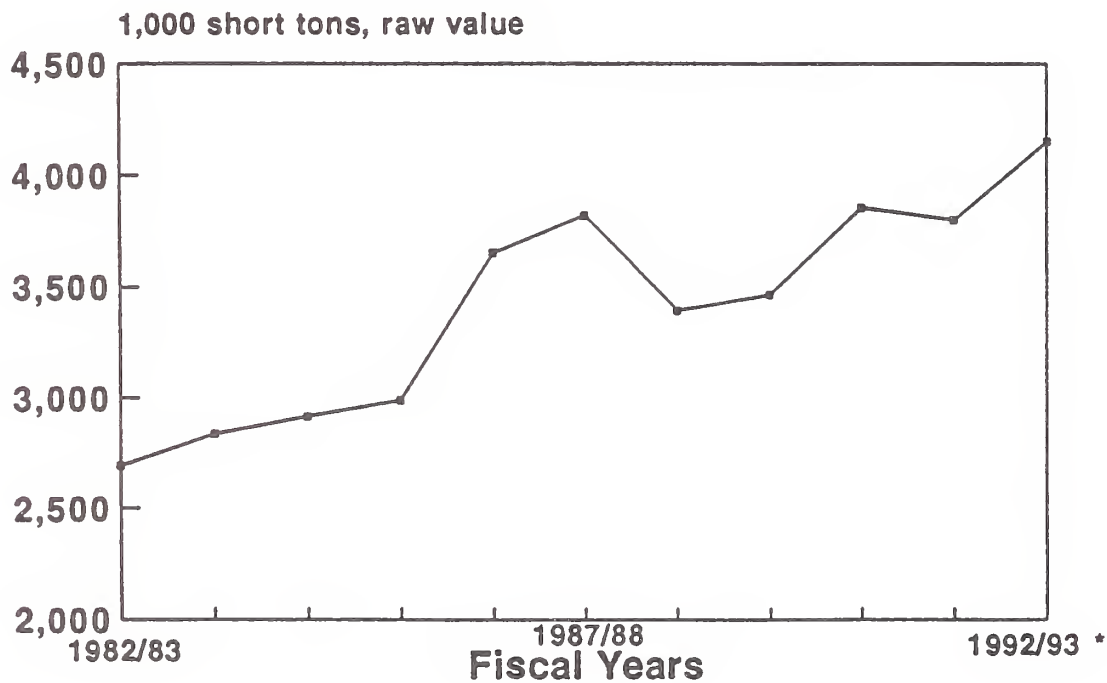


* Forecast.

Source: Interagency Sugar Estimates Committee, USDA.

Figure 2

U.S. Beet Sugar Production



* Forecast.

Source: Interagency Sugar Estimates Committee, USDA.

Table 1--U.S. sugar supply and use, fiscal years 1/

Items	1988/89	1989/90	1990/91	1991/92 Estimate	1992/93 Projections	
					September	November
1,000 short tons, raw value						
Beginning stocks 2/	1,316	1,224	1,210	1,513	1,381	1,428
Production 2/	6,712	6,623	6,915	7,250	7,500	7,550
Beet sugar	3,396	3,466	3,855	3,800	4,100	4,150
Cane sugar	3,316	3,157	3,060	3,450	3,400	3,400
Florida	1,563	1,404	1,810	1,833	1,760	1,760
Louisiana	797	844	438	762	800	850
Texas	110	59	88	111	100	115
Hawaii	846	850	724	744	730	675
Imports 2/	2,037	2,568	2,825	2,190	1,997	1,967
Under quota 3/	1,376	1,950	2,298	1,480	1,357	1,327
Other 4/	661	547	527	710	640	640
Supply, total	10,065	10,415	10,950	10,953	10,878	10,945
Exports 2/ 5/	516	614	682	625	590	590
Domestic deliveries 2/	8,264	8,531	8,773	8,875	9,000	9,000
For domestic food use	8,227	8,488	8,704	8,780	8,910	8,910
Other 6/	37	43	69	95	90	90
Miscellaneous 7/	61	60	-18	25	25	25
Use, total	8,841	9,205	9,437	9,525	9,615	9,615
Ending stocks 2/	1,224	1,210	1,513	1,428	1,263	1,330
Stocks to use ratio	13.81	13.15	16.03	14.99	13.14	13.83

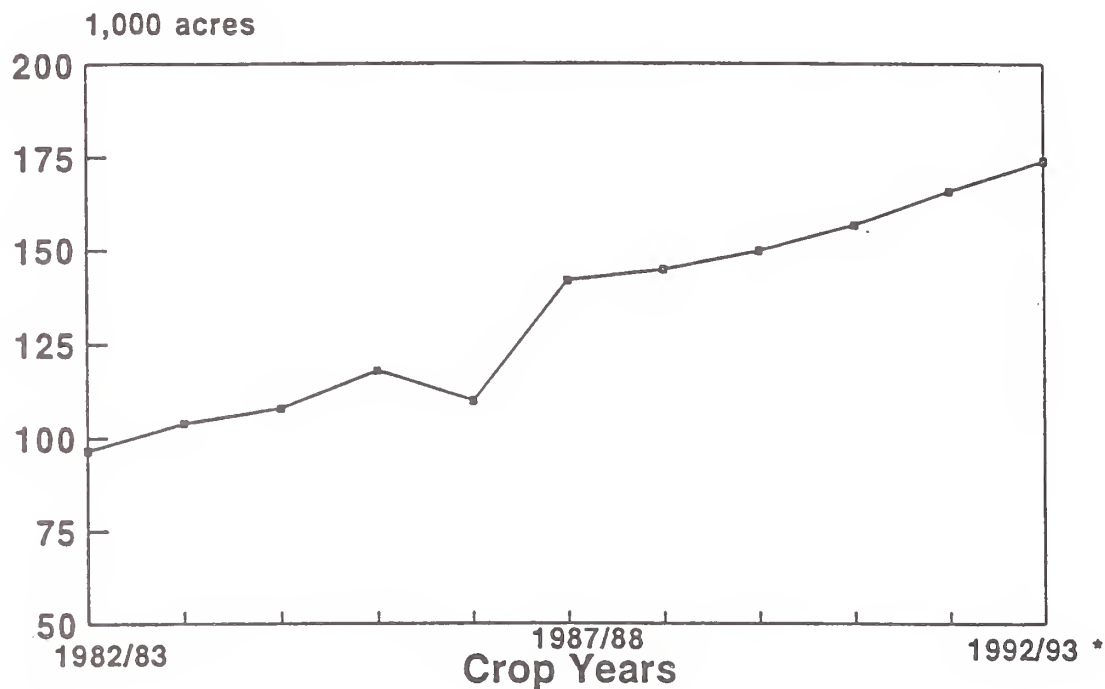
NA=Not available.

Note: ASCS, "Sweetener Market Data" published November 19, 1992 provided monthly data to finalize key 1991/92 data items (1,000 short tons, raw value); production (7,280); deliveries (8,919); and ending stocks (1,358). The U.S. sugar supply and use statistics will be officially updated for release in USDA's World Agricultural Supply and Demand Estimates (WASDE) report December 10, 1992.

1/ Fiscal years beginning Oct. 1. Puerto Rico not included. 2/ Historical data are from NASS, "Sugar Market Statistics" and ASCS, "Sweetener Market Data." 3/ Actual arrivals under the quota with late entries and quota overfills assigned to the fiscal year in which they actually arrived. The tariff rate quota for 1992/93 was set at 1,357,000 short tons. Estimated arrivals assume shortfall of 30,000 tons. 4/ Quota exempt imports (for reexport, for polyhydric alcohol, from Canada, and high-duty), plus arrivals from Puerto Rico. Imports of flavored sugar and products with very high sugar content such as tea mixes, gelatin, and miscellaneous food preparations are not included. The sugar content of imports of these products is estimated at slightly more than 100,000 STRV in 1991/92. 5/ Includes shipments to Puerto Rico. Other exports are mostly reexports. 6/ Transfer to sugar containing products for reexport, and to polyhydric alcohol. 7/ CCC disposal for domestic nonfood use, refining loss/gain adjustment, and residual.

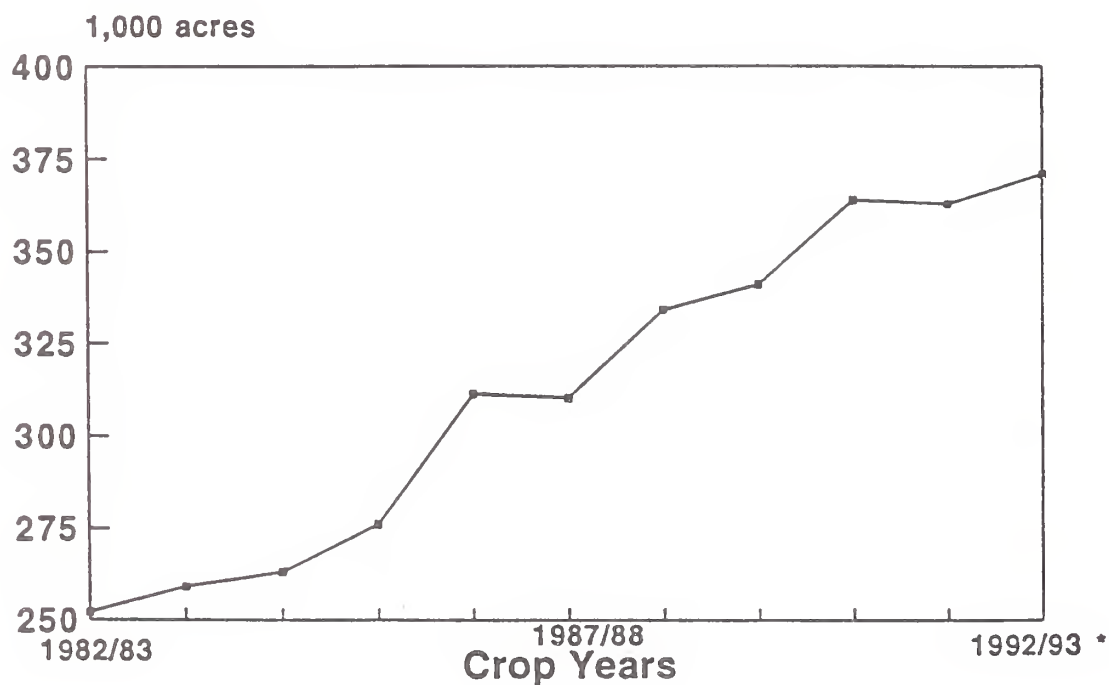
Source: Interagency Sugar Estimates Committee, USDA, November 10, 1992

Figure 3
Michigan: Sugarbeet harvested area



* Estimate.
Source: Crop Production Report,
Nov. 1992, USDA.

Figure 4
Minnesota: Sugarbeet harvested area



* Estimate.
Source: Crop Production Report,
Nov. 1992, USDA.

Table 2—U.S. Sugarbeets: Acreage, production, and yield

Crop year	Sugarbeets			Beet sugar			
	Acreage harvested	Production	Yield per acre harvested	Production raw value	Recovered	Yield per harvested acre, raw value	Production refined
	1,000 acres	1,000 tons	Tons	1,000 tons	Percent	Tons	1,000 tons
1982/83	1,027	20,894	20.3	2,737	13.10	2.67	2,568
1983/84	1,056	20,992	19.9	2,699	12.86	2.56	2,522
1984/85	1,096	22,134	20.2	2,905	13.12	2.65	2,715
1985/86	1,102	22,529	20.4	3,000	13.32	2.72	2,804
1986/87	1,191	25,162	21.1	3,416	13.58	2.87	3,193
1987/88	1,252	28,072	22.4	3,998	14.24	3.19	3,736
1988/89	1,301	24,810	19.1	3,507	14.14	2.64	3,278
1989/90	1,295	25,131	19.4	3,442	13.70	2.60	3,217
1990/91	1,377	27,513	20.0	3,842	13.96	2.79	3,591
1991/92	1,388	28,092	20.2	3,729	13.27	2.69	3,485
1992/93 1/	1,414	29,080	20.6	4,150	14.27	2.93	3,879

1/ Estimated, November Crop Production Report.

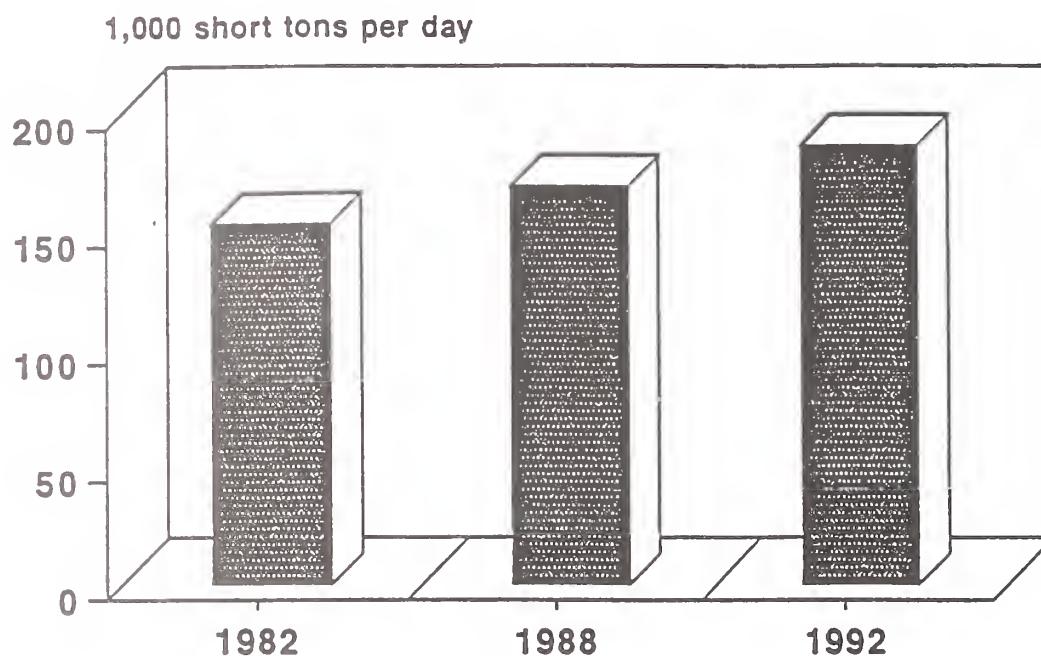
Source: Crop Production, various issues, USDA.

Table 3—U.S. Sugarbeets: Manufacturing data

Crop year	Operating factories	Sugarbeets				Beet sugar				
		Received for processing		Processed		Per ton of beets			Extraction rate	
		Total received	Sucrose content	Total sliced	Sucrose in cossettes	Total refined	Received	Sliced	Received	Sliced
		1,000 tons	Percent	1,000 tons	Percent	1,000 tons	—Pounds—	—Pounds—	—Percent—	—Percent—
1982/83	38	20,894	15.76	20,539	15.20	2,558	245	249	77.68	81.94
1983/84	41	20,992	15.25	20,548	14.90	2,522	240	245	78.78	82.37
1984/85	41	22,134	15.80	21,606	15.23	2,715	245	251	77.63	82.51
1985/86	34	22,529	15.88	21,960	15.32	2,804	249	255	78.38	83.35
1986/87	36	25,162	16.05	24,657	15.54	3,193	254	259	79.06	83.33
1987/88	36	28,072	16.89	27,601	16.34	3,736	266	271	78.80	82.84
1988/89	36	24,810	16.77	24,356	16.27	3,278	264	269	78.79	82.72
1989/90	36	25,131	16.32	24,600	15.82	3,217	256	262	78.44	82.66
1990/91	36	27,513	16.55	26,608	16.05	3,591	261	270	78.85	84.11
1991/92	36	28,092	15.74	27,098	15.27	3,485	248	257	78.78	84.15

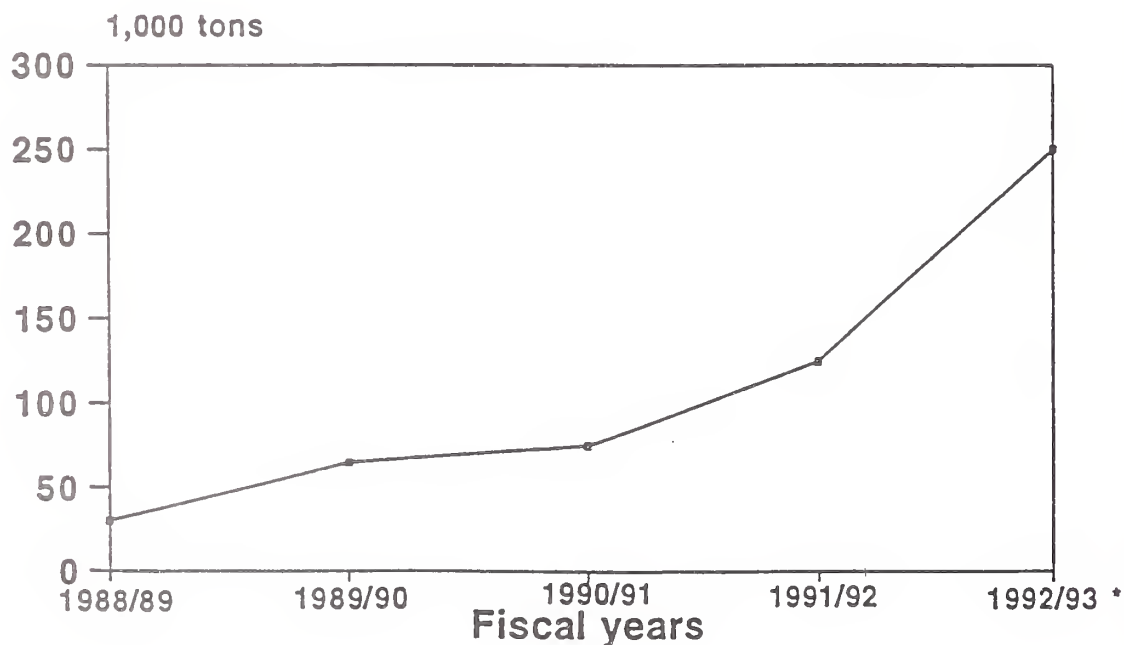
Source: Crop Production, various issues, USDA.

Figure 5
U.S. Sugarbeet Factories Slicing Capacity



Source: United States Beet Sugar Association.

Figure 6
U.S. Production of Sugar From Beet Molasses Desugarization

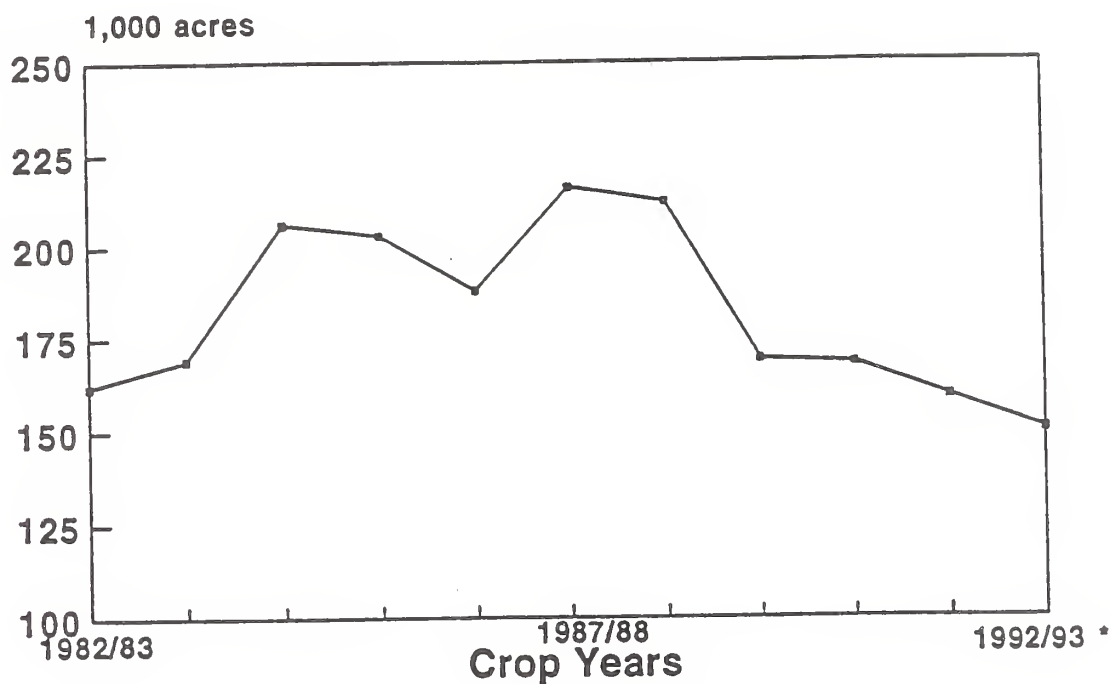


* Estimate.

Source: Estimates, Economic Research Service, USDA

Figure 7

California: Sugarbeet harvested area

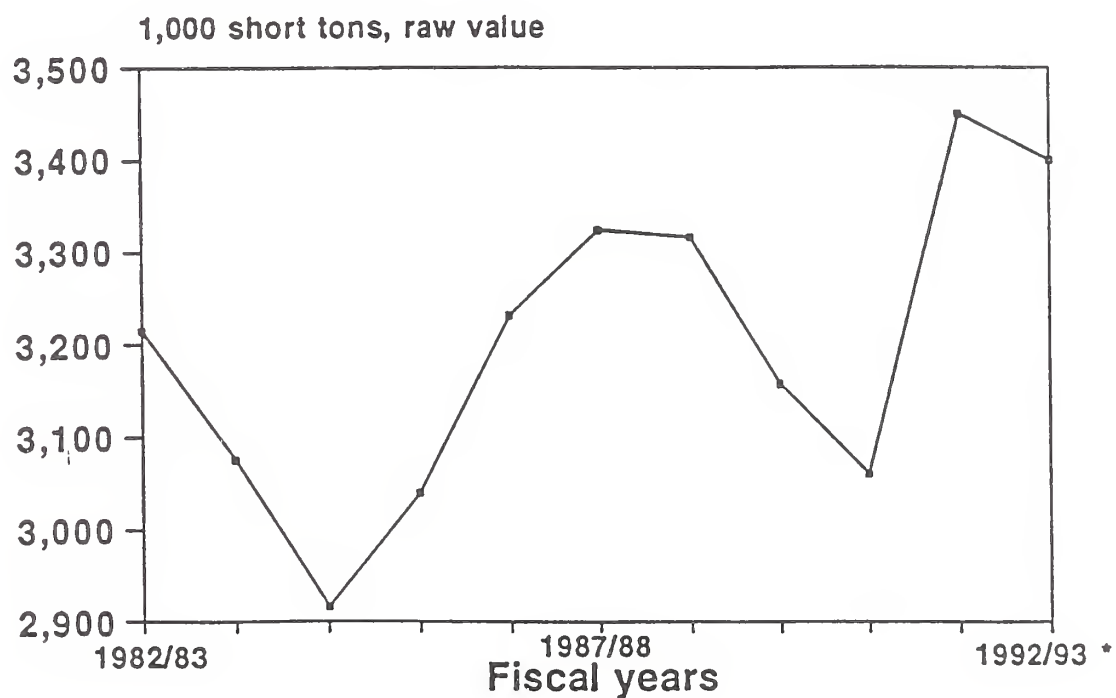


* Estimate.

Source: Crop Production Report,
Nov. 1992, USDA.

Figure 8

U.S. Cane Sugar Production



* Forecast.

Source: Interagency Sugar Estimates
Committee, USDA.

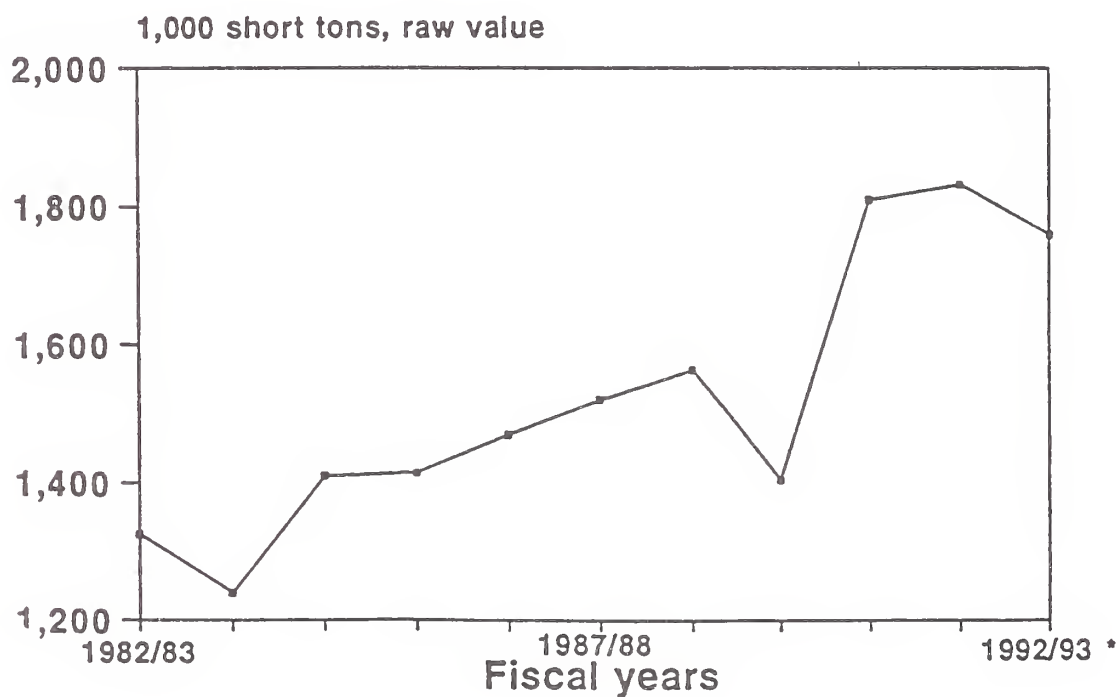
Table 4--U.S. sugarcane: Area, yield, production, output, recovery rate, and sugar yield per acre

Crop year	Area harvested	Crop yield per acre	Sugarcane or sugarbeet production	Sugar production	Recovery rate	Sugar yield per acre
	1,000 acres	Short tons	1,000 short tons	1,000 short tons, raw value	Percent	Short tons
1982/83	700.4	40.6	28,449	3,063	10.77	4.37
1983/84	733.4	37.1	27,201	2,930	10.77	4.00
1984/85	700.7	37.1	26,008	3,007	11.56	4.29
1985/86	722.8	37.2	26,877	3,033	11.28	4.20
1986/87	750.7	38.5	28,936	3,281	11.34	4.37
1987/88	778.3	36.0	28,026	3,333	11.89	4.28
1988/89	793.6	35.9	28,479	3,398	11.93	4.28
1989/90	803.3	34.9	28,069	3,176	11.31	3.95
1990/91	726.4	36.4	26,475	3,152	11.91	4.34
1991/92	849.6	34.0	28,960	3,430	11.84	4.03
1992/93 1/	887.0	32.6	29,080	3,400	11.69	3.83

1/ Estimate.

Source: Crop Production, USDA.

Figure 9
Florida: Cane Sugar Production



* Forecast.

Source: Interagency Sugar Estimates Committee, USDA.

Map 1

Louisiana's Sugarcane and Hurricane Andrew

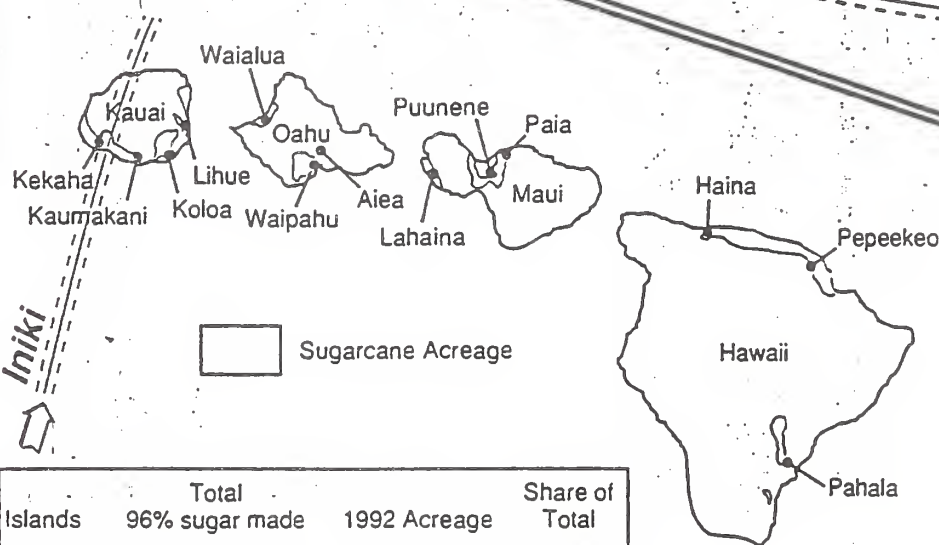
Parishes	1992 Acreage	Share of Total
	Acres	Percent
1 Iberia	57,000	15.1
2 St. Mary	46,000	12.2
3 Assumption	37,000	9.8
4 Iberville	34,600	9.2
5 St. Martin	34,000	9.0
6 Lafourche	33,185	8.8
7 St. James	25,000	6.6
8 Vermillion	18,000	4.8
9 Ascension	16,600	4.4
10 Pointe Coupee	16,000	4.2
11 W. Baton Rouge	11,400	3.0
12 Terrebonne	11,100	2.9
13 Avoyelles	11,000	2.9
14 Lafayette	10,000	2.6
15 St. John the Baptist	8,000	2.1
16 Rapides	3,500	0.9
17 St. Landry	3,500	0.9
18 St. Charles	2,100	0.6
19 E. Baton Rouge	110	0.1

¹ Less than 0.1 percent.

Source: American Sugarcane League of the USA, Inc., Thibodaux, LA

 Top Six Parishes

Hawaii's Sugarcane and Hurricane Iniki



Islands	Total 96% sugar made	1992 Acreage	Share of Total
	Short tons	Acres	Percent
Kauai	176,470	19,397	28.7
Maui	240,035	19,353	28.7
Hawaii	182,825	18,134	26.7
Oahu	125,770	10,832	15.9

Source: Hawaiian Sugar Planters' Association

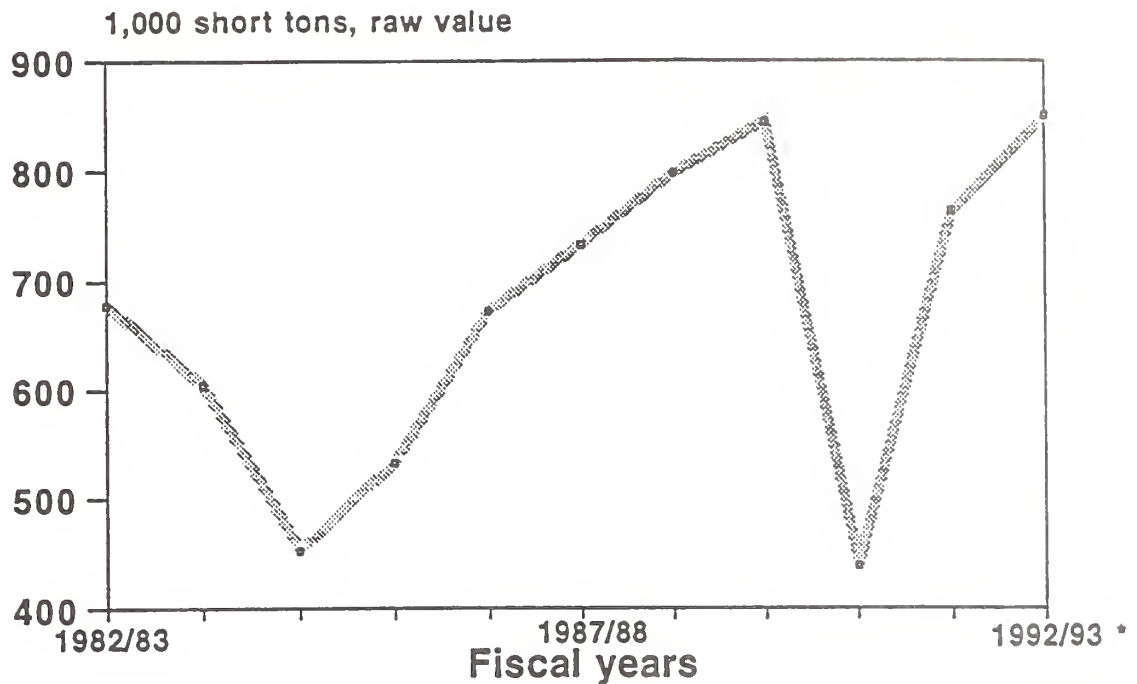
Table 5--U.S. Sugar Industry Processing Capacity

Industry	Area	Item	1982	1988	1992
short tons per day					
Sugarbeet Processors:					
Great Lakes		Slicing cap.	17,400	24,900	25,700
		Ave. size	2,900	4,150	4,283
Red River Valley		Slicing cap.	37,500	38,200	43,925
		Ave. size	5,357	5,457	6,275
Great Plains		Slicing cap.	35,300	40,100	42,700
		Ave. size	3,209	3,645	3,882
Northwest		Slicing cap.	28,400	29,000	36,000
		Ave. size	7,100	7,250	9,000
California		Slicing cap.	34,350	36,500	37,600
		Ave. size	4,294	4,563	4,700
National Total		Slicing cap.	171,100	168,700	185,925
		Ave. size	4,074	4,686	5,165
Sugarcane Mills:					
Florida		Grinding cap.	97,800	115,500	118,750
		Ave. size	13,971	16,500	16,964
Louisiana		Grinding cap.	103,650	119,336	145,000
		Ave. size	5,183	5,967	7,250
Texas		Grinding cap.	9,500	10,500	10,500
		Ave. size	9,500	10,500	10,500
Hawaii		Grinding cap.	64,400	56,100	56,100
		Ave. size	4,600	4,675	4,675
National Total		Grinding cap.	275,350	301,436	330,350
		Ave. size	6,568	7,523	8,246
Cane Sugar Refiners					
		Melting cap.	30,760	22,400	22,075
		Ave. size	1,465	1,723	1,840

Source: U.S. beet, cane, and refinery industry sources.

Figure 10

Louisiana: Cane Sugar Production

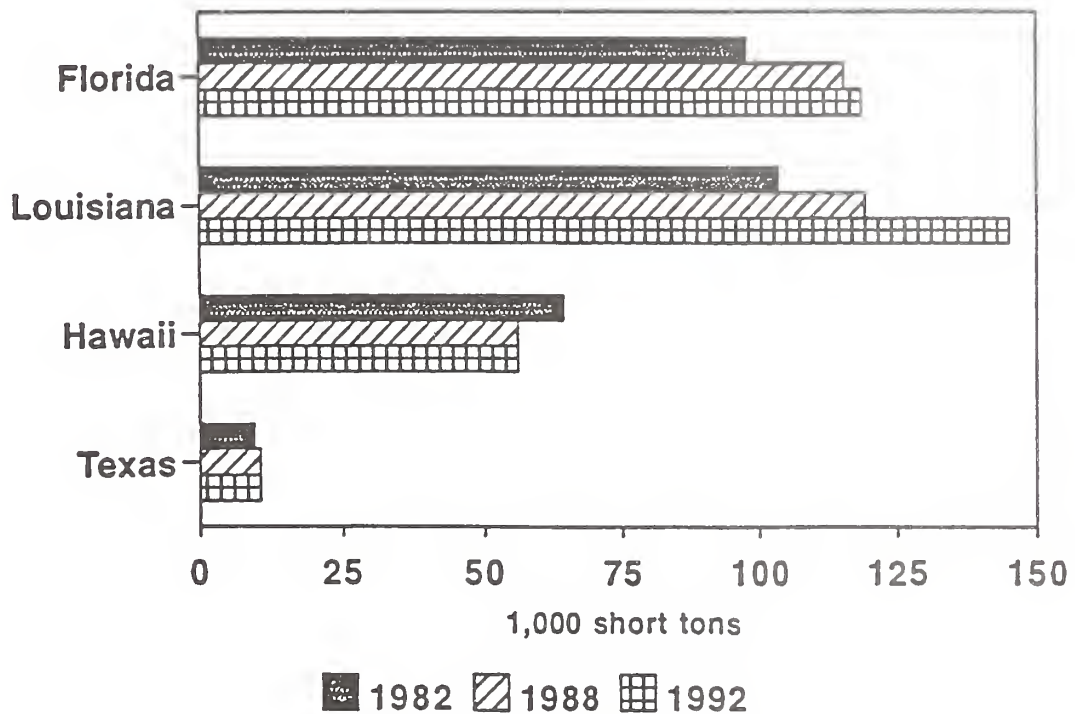


* Forecast.

Source: Interagency Sugar Estimates Committee, USDA.

Figure 11

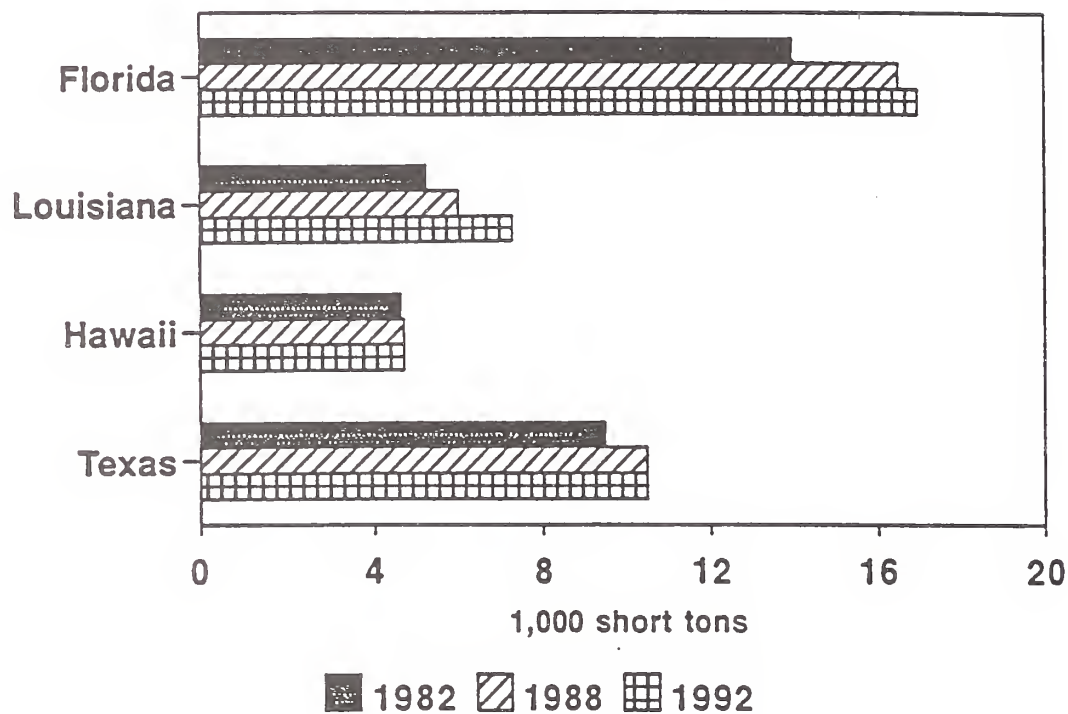
U.S. Sugarcane States: Total Grinding Capacities



Source: Interagency Sugar Estimates Committee, USDA.

Figure 11a

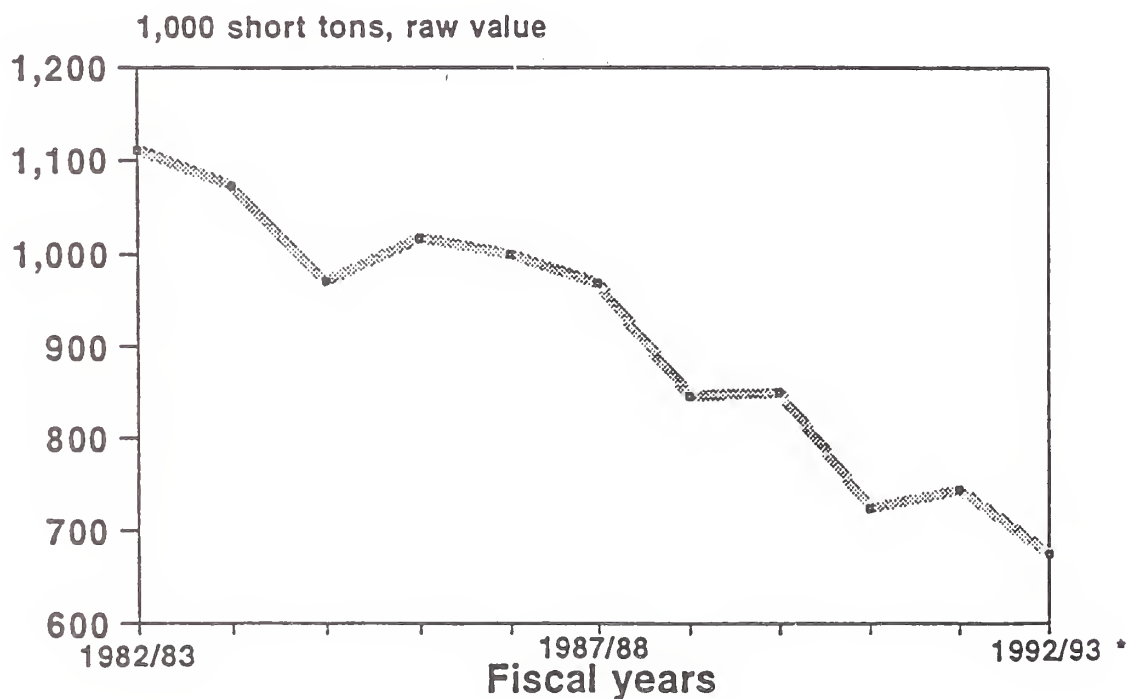
U.S. Sugarcane Mills: Average Size



Source: Interagency Sugar Estimates Committee, USDA.

Figure 12

Hawaii: Cane Sugar Production



* Forecast.

Source: Interagency Sugar Estimates Committee, USDA.

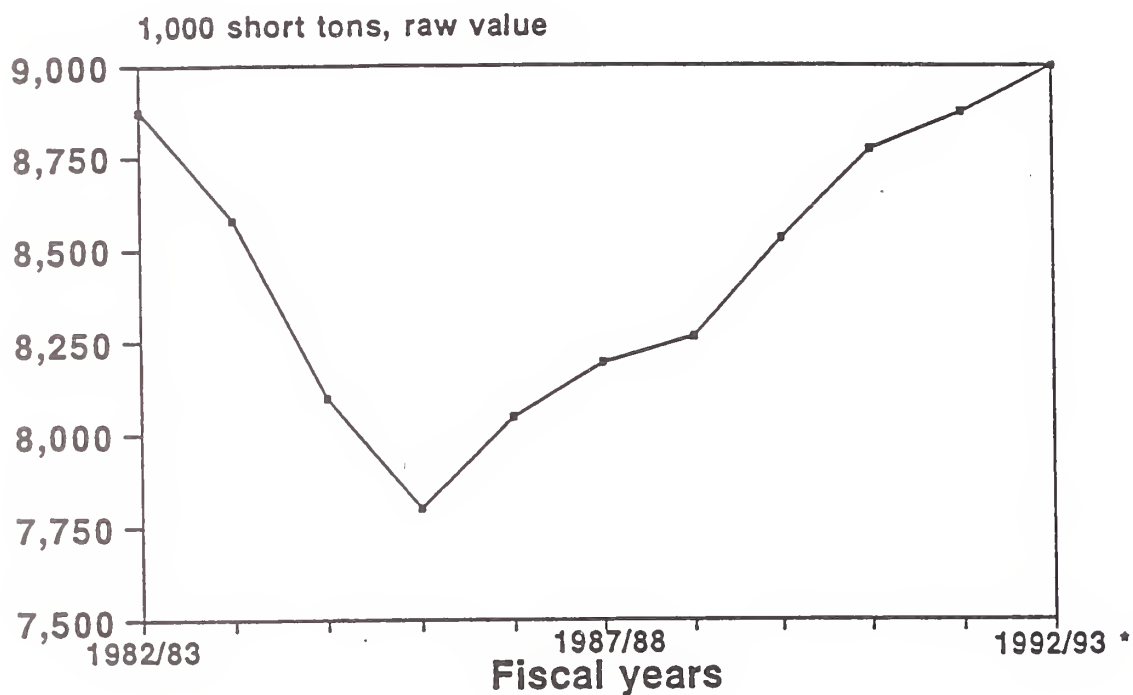
U.S. Sweeteners Market

Key Developments To Watch

- **Production**
 - Beet Sugar Prospects For Continued Upward Trending Growth Due to Area, Yield Increases, Quality Improvements
 - Further Growth in Beet Molasses Desugaring
 - Prospects for Cane Molasses Desugaring
 - Water and Crop Disease Issues in Western U.S.
 - Will Florida & Louisiana Continue to Expand and Hawaii Contract?
 - Prices of Alternative Crops to Beets & Cane

Figure 13

U.S. Sugar Consumption



* Estimate.

Source: Interagency Sugar Estimates Committee, USDA.

Table 6—U.S. Sugar Consumption

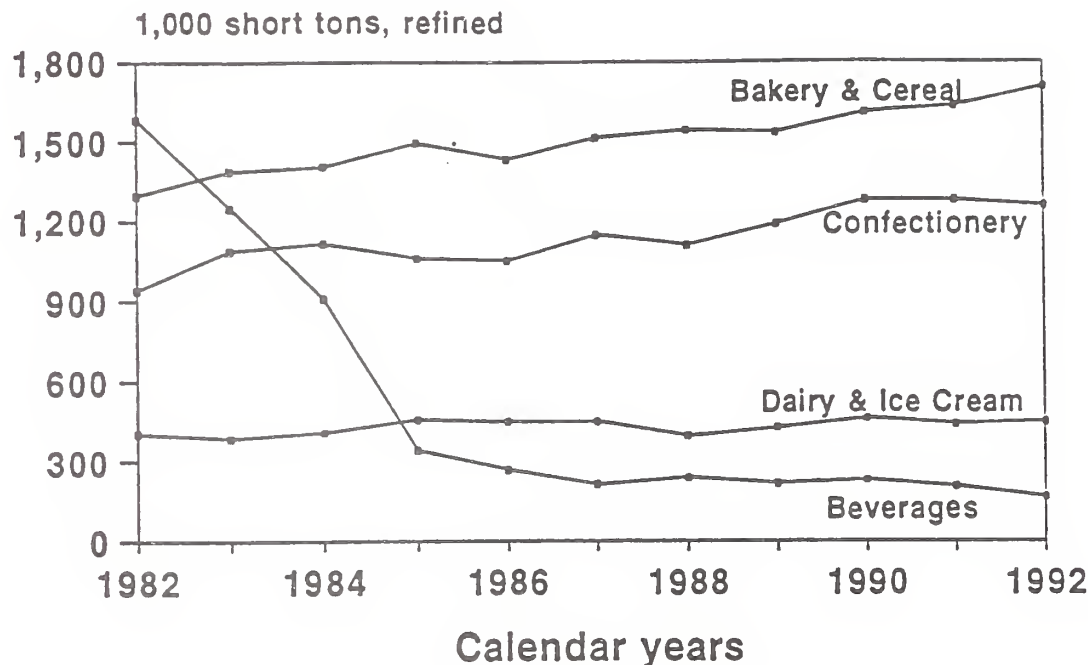
Fiscal year	Total deliveries	Volume change from previous year	Percent increase from previous year	Per capita food & beverage use
	-1,000 short tons, raw value-		Percent	Pounds, refined
1982/83	8,874	-332	-3.6	70.9
1983/84	8,578	-296	-3.3	68.0
1984/85	8,097	-481	-5.6	63.3
1985/86	7,799	-298	-3.7	60.3
1986/87	8,046	247	3.2	61.6
1987/88	8,193	147	1.8	62.2
1988/89	8,262	69	0.8	62.3
1989/90	8,531	269	3.3	63.7
1990/91	8,773	235	2.8	64.6
1991/92 1/	8,875	102	1.2	64.4
1992/93 2/	9,000	125	1.4	64.7

1/ Estimate. 2/ Forecast.

Source: Interagency Sugar Estimates Committee, USDA.

Figure 14

U.S. Sugar Deliveries by Type of Major Food Uses



* Estimate.
Source: USDA

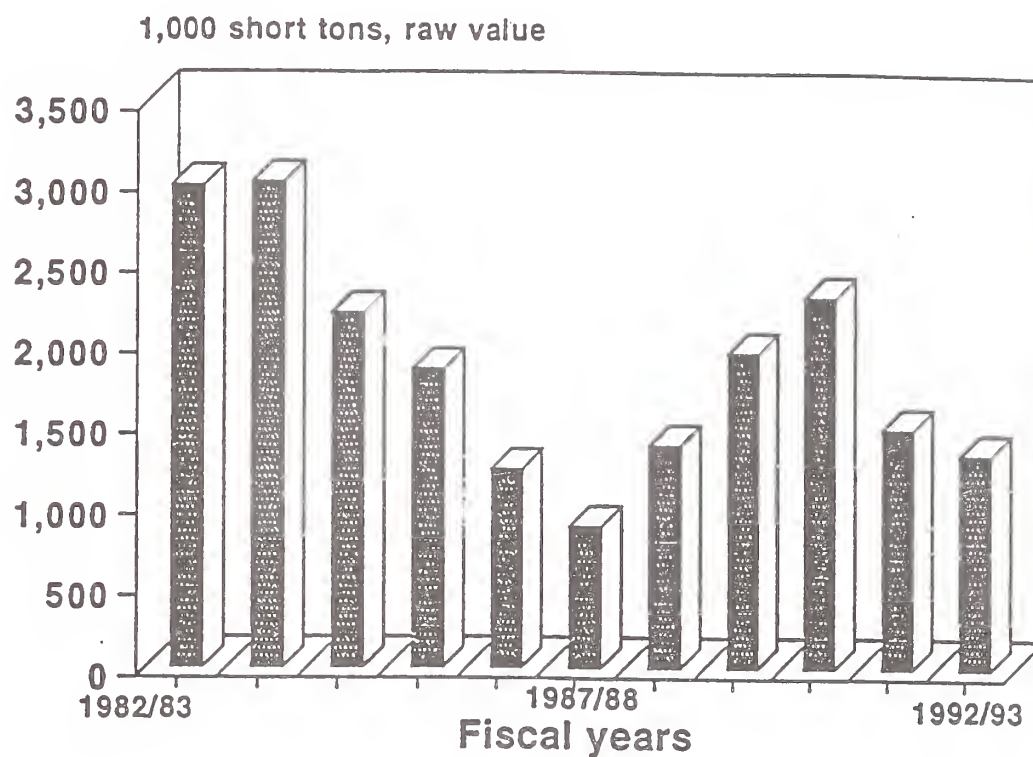
U.S. Sweeteners Market

Key Developments To Watch

- Consumption
 - Growth in Sugar Use At Current or Expanded Rates
 - Corn Sweetener Inroads in Traditional Sugar Markets
 - High Intensity Sweeteners (HIS)—Increased Competition Among HIS and/or Increased Substitution for Corn Sweeteners and Sugar in Food & Beverage Uses

Figure 15

U.S. Imports Under Quota



Source: USDA

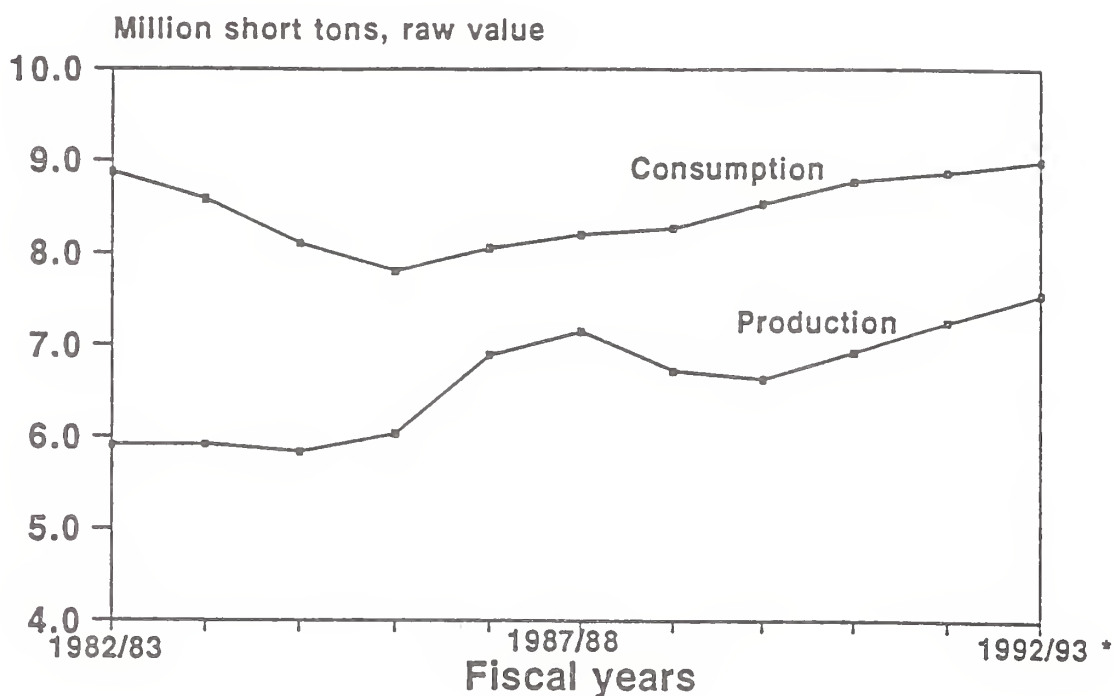
Table 7—U.S. sugar imports under quota and tariff-rate quota, by country

Country	1992/93 10/1/92-9/30/93		Country	1992/93 10/1/92-9/30/93	
	Quota allocation	Actual imports 1/		Quota allocation	Actual imports 1/
Short tons, raw value			Short tons, raw value		
Argentina	55,272	1,735	Mauritius	15,425	185
Australia	106,688	1,917	Mexico	8,001	—
Barbados	8,998	—	Mozambique	16,710	373
Belize	14,139	63	Nicaragua	26,993	—
Bolivia	10,283	735	Panama	37,277	4,847
Brazil	186,383	—	Papua New Guinea	8,001	—
Colombia	30,849	25,385	Paraguay	8,001	155
Congo	8,001	139	Peru	52,702	1,974
Costa Rica	19,281	—	Philippines	173,528	—
Cote D'Ivoire	8,001	—	St. Christopher-Nevis	8,001	—
Dominican Republic	226,230	—	South Africa	29,564	—
Ecuador	14,139	678	Swaziland	20,567	20,566
El Salvador	33,420	33	Taiwan	15,425	—
Fiji	11,569	11,569	Thailand	17,995	—
Gabon	8,001	—	Trinidad-Tobago	8,998	3,994
Guatemala	61,699	195	Uruguay	8,001	127
Guyana	15,425	15,419	Zimbabwe	15,425	191
Haiti	8,001	—			
Honduras	12,854	—	Subtotal	1,355,124	90,727
India	10,283	—			
Jamaica	14,139	—	Specialty sugars	1,825	—
Madagascar	8,001	—			
Malawi	12,854	448	Grand total	1,356,949	90,727

— = Not applicable. 1/ Oct. 1, 1992 through November 15, 1992.
Source: Foreign Agricultural Service, USDA.

Figure 16

U.S. Sugar Production and Consumption



* Estimate.

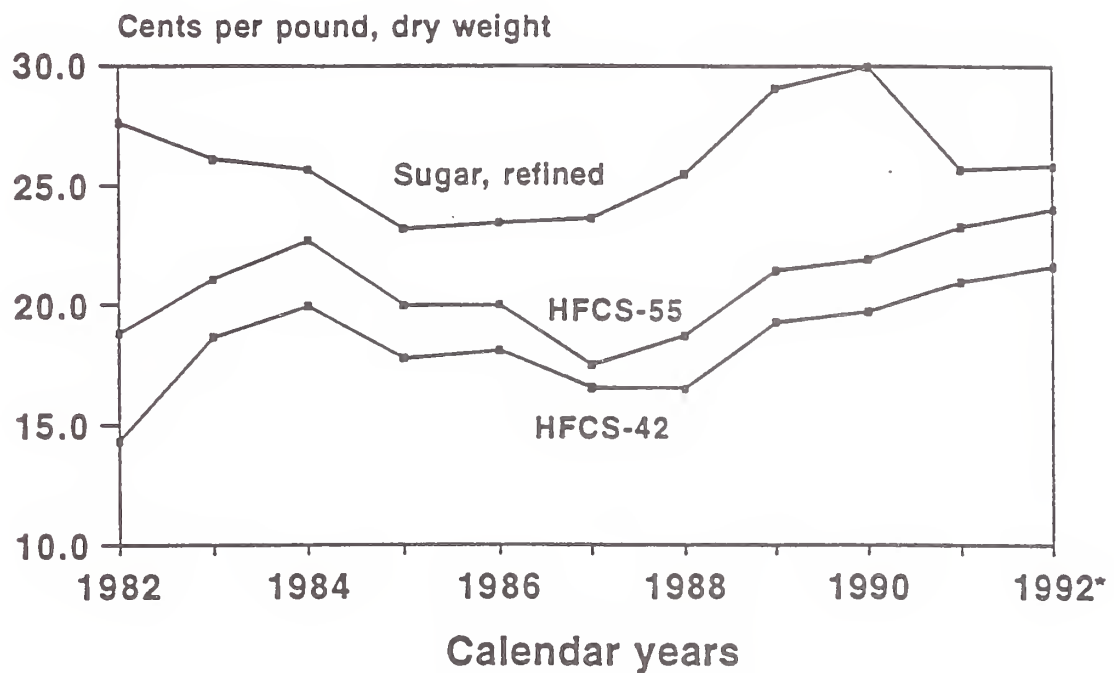
Source: Interagency Sugar Estimates Committee, USDA.

U.S. Sweeteners Market

Key Developments To Watch

- Trade
 - Will Import Limit of 1.250 Million Tons Be Reached Forcing Market Allotments?
 - Will Increased Exports of U.S. HFCS Flow to Canada & Mexico?
 - Will Mexico Become a Surplus Sugar Producer and Ship Increasing Volumes of Sugar to the U.S. Under NAFTA?

Figure 17
**Wholesale Prices for Sugar and HFCS,
 Midwest Market**



* Average January-October.
 Source: USDA.

Figure 18
**U.S. HFCS Production and Processing
 Capacity**

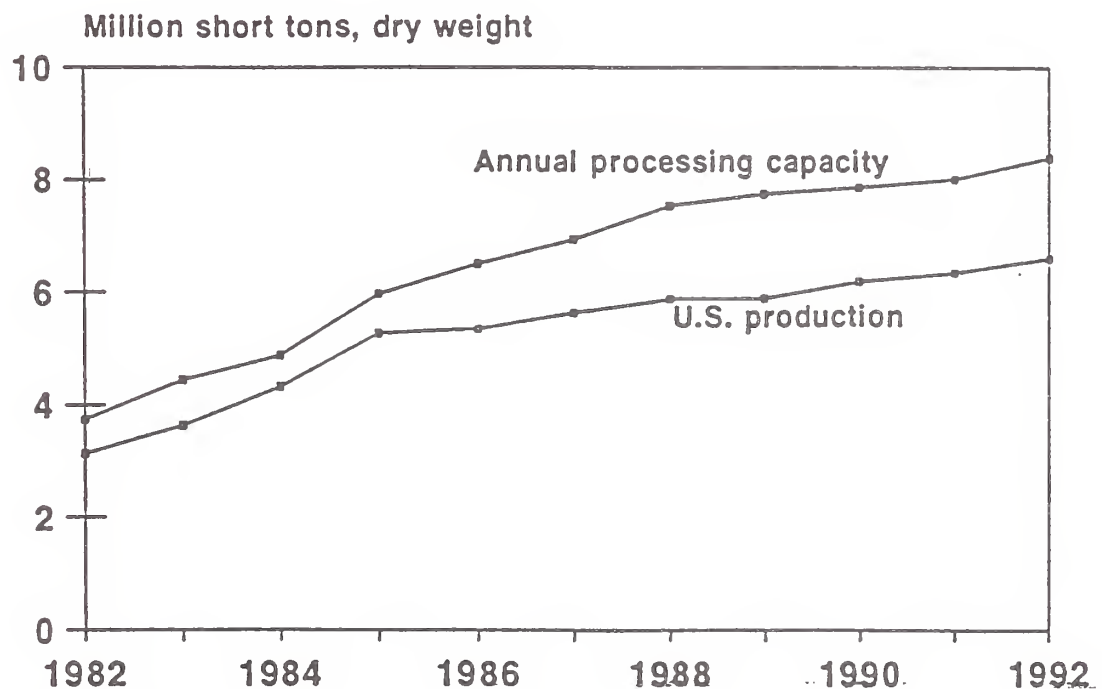
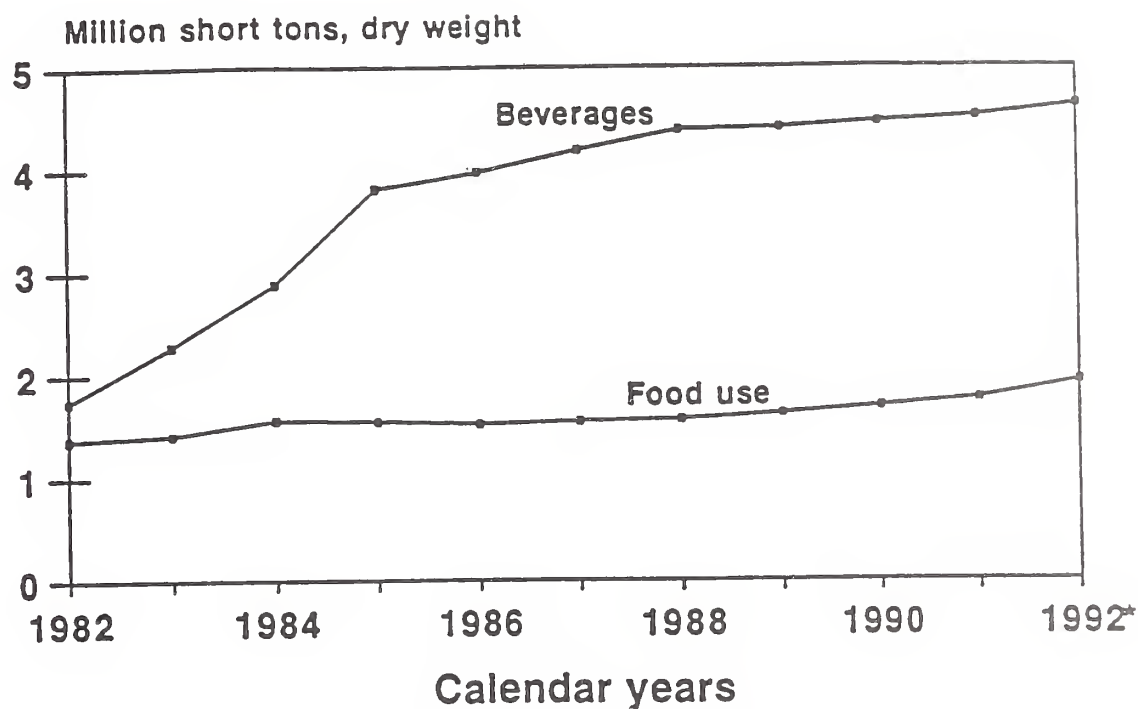


Figure 19

U.S. HFCS Deliveries for Domestic Food and Beverage Use



* Estimate

Table 8--U.S. High Fructose Corn Syrup (HFCS) Production Capacity, Production, Deliveries, and Per Capita Use 1/

Year	Production capacity	Production	Domestic deliveries for food & beverage use	Volume change from previous year	Percent increase from previous year	Per capita food & beverage use
-----1,000 short tons, dry basis-----					Percent	Pounds, refined
1982	3,743	3,137	3,108	519	20.0	26.8
1983	4,448	3,643	3,684	576	18.5	31.4
1984	4,891	4,338	4,427	743	20.2	37.5
1985	5,967	5,271	5,349	922	20.8	44.8
1986	6,519	5,348	5,490	141	2.6	45.6
1987	6,949	5,634	5,732	242	4.4	47.2
1988	7,541	5,885	5,950	218	3.8	48.5
1989	7,750	5,892	6,022	72	1.2	48.7
1990	7,867	6,186	6,130	108	1.8	49.1
1991 2/	8,121	6,392	6,332	202	3.3	50.1
1992 3/	8,396	6,615	6,550	218	3.4	51.3

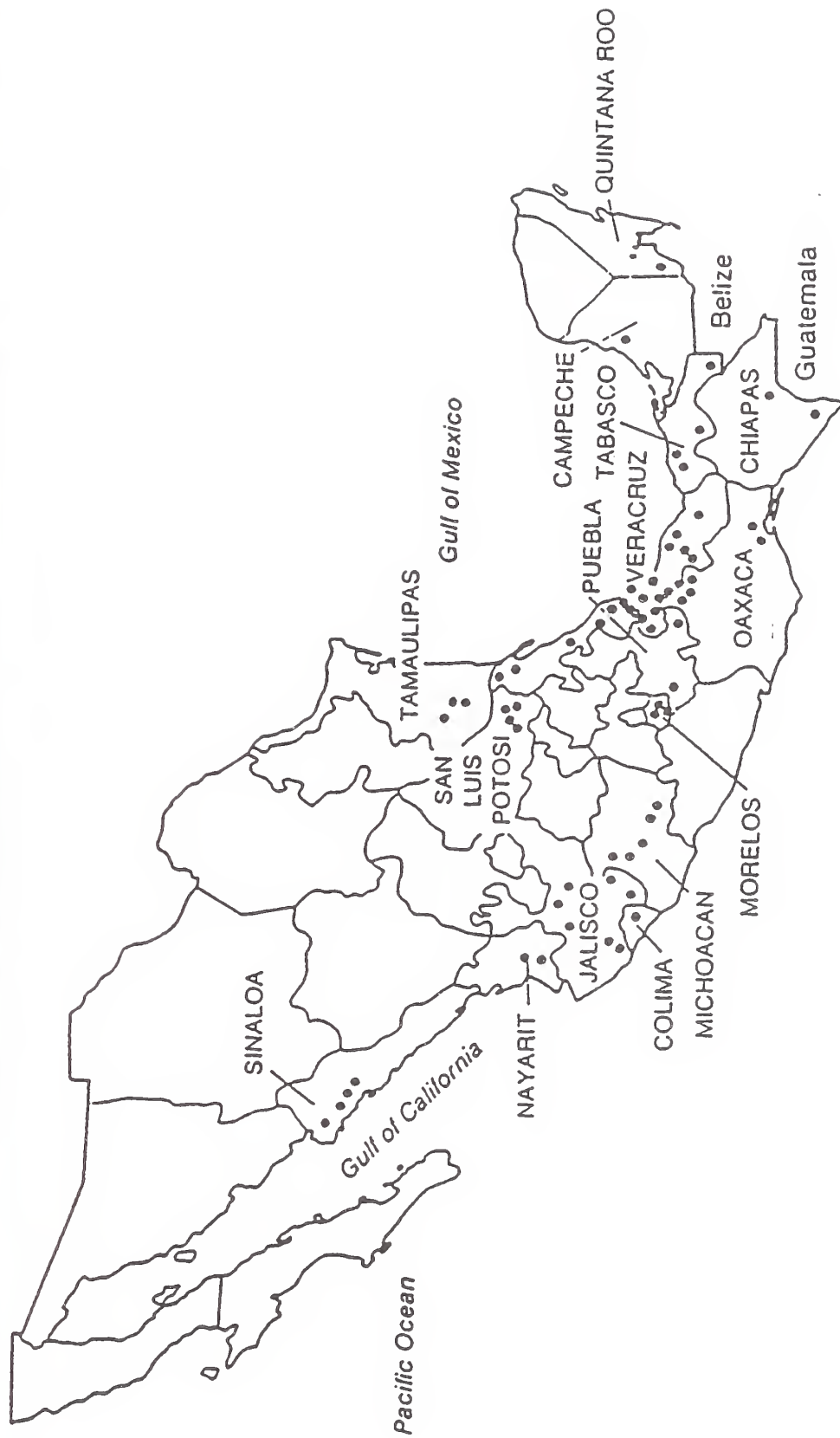
Note: HFCS data for calendar 1991 were revised upwards based on preliminary 1992 trends. Both 1991 and 1992 data will be further revised when complete HFCS data for calendar 1992 becomes available.

1/ U.S. HFCS data may contain estimates for crystalline fructose. 2/ Estimate. 3/ Preliminary.

Source: Economic Research Service, USDA.

Map 2

Mexico's Sugarcane Producing States and Mill Locations



Outlook '93

For Release : Wednesday, December 2nd, 1992

EUROPEAN SUGAR : EAST AND WEST

Patrick du Genestoux
Managing Director
Etudes et Recherches Sucr  res (ERSUC), Paris

The rest of the world, particularly yours, maybe considered as specially peaceful, quiet even dull, when compared to what is happening to us Europeans. For the last 40 years, we had lived in a world of no-change, where everything was taken for granted, settled in a state of comfort on each side of the wall, both physical and intellectual on the western side, just intellectual on the Eastern side, and that was it.

Now and suddenly we have 3 wars, much starvation and many shortages, huge migrations, considerable joblessness and a real revolution in the country side is being started. To make the whole thing tastier we have, as I write this, a declared war with you on agriculture and trade issues, of course not to be put on the same footing as the real ones (nobody will die, just jobs, farms and businesses, whatever the outcome).

And still we pretend to continue carrying out a process of all-European economic and political integration, which of course is the craziest thing to do under such circumstances, but which in many ways we cannot skip doing if we want to avoid heavier penalties and even plain chaos.

What is happens and will happen to sugar production tells a lot about today's and tomorrow's Europe. From comfort, sometimes opulence, fast technical progress and a solidly positive contribution to our trade balance, sugar moves to reconsideration, reform, reshaping of the institutional frame, even revolution.

The present picture is striking : we have produced far more sugar than we cared to at present world prices, not just in the EC but in Poland, Austria, Hungary and Turkey, but still 100 million Europeans do not have enough sugar to eat.

Admittedly, the case of those who do not eat requires more attention and raises more problems than for us at the Western edge of the Continent.

This is maybe why those who asked me to address you have put EAST before WEST, an order which I will follow.

EAST : BACK TO WORK, A COSTLY PROCESS

Central and Eastern Europe is a more than good potential area for sugar : it was sugarland, accounting for more than half of the world sugar production and exports before World War I. Actually sugar beet was born there. Sugar per hectare was higher in Czechoslovakia than in France in the nineteen thirties and, though land collectivization had disastrous impacts, beet factories' technical standards were still high in the late fifties' Eastern Europe. In fact this is where we find them now : thirty years behind us in terms of extraction results, sugar quality, labour productivity and energy consumption. The main culprit, interestingly, is Cuba. When the Sugar Island was assigned the task to supply, with raw sugar, all the increasing requirements of the CMEA, nicely complementing beet slicing with cane sugar refining, investments in the beet sugar sector lost priority, and genetic research deteriorated. Factory yields dropped from 14% to 11% on average in sugar produced per beet purchased, the result of inadequate work on variety and chaotic transport logistics. Sugar refining was far easier and profitable. The 7 "large" Bulgarian factories never succeeded to produce more than 100,000 T - in disastrous conditions - but were able to refine 400,000 T of Cuban sugar.

Production still strong.....

Bad as it is in terms of productivity, the system is sturdier than we thought. Reform, revolution, decentralization and inflation, could have played havoc in such a sensitive industry which requires a strong degree of planning. Overall though, the sugar industry is still there, and not performing really worse than it used to before the political and economic change process started. Production has indeed dropped, but this is due more to adverse climatic conditions, particularly in Ukraine, than to political factors. Certainly there are critical situations : war in Croatia and utterly absurd management of agriculture in Rumania, but normally the system still works and even manages to show better results, like this year in Russia. Transportation of sugar works surprisingly well. Most of the Polish, Czech and Rumania factories may be technically bankrupt but they work, quite often because the former factory managers have survived the set-up of workers "collectives" and the old industry bosses still reign.

.... but chaos on marketing and consumption

Consumption, on the other hand, was bound to suffer. The availability of sugar was a top priority for the old regimes. Shortages started to appear with Mr Gorbachev's absurd but quite understandable campaign against alcoholism. Shortages have existed ever since in most of the former USSR, Poland, Rumania, Bulgaria.

The degree of waste must be substantial since in 1992, CIS republics imported the unprecedented quantity of 6 million tonnes (3.5 MT of raws, almost exclusively from Cuba, and 2 MT of whites from everywhere : the EEC, Hungary, Turkey, India, Thailand, China, Brazil) and at some point the sugar prices fell in current rubles, but rationing continued and was severe in parts of Russia, and in Ukraine, an exporting country.

In fact, no marketing competence exist in the sugar industry, nor in any industry either. It was and still is located elsewhere. As the factories did not have to worry about marketing and shipping, the storage capacity is inadequate : it can only take less than 50% of the volume produced in an exporting country like Ukraine (in France is more like 100%). As a result outdoor storage is not unfrequent.

When sugar shortages appeared they could only get worse as shortages extended to about every simple product and inflation could no longer be put under control. This is because sugar has become one of the many moneys in circulation. In Ukraine, even the beet and sugar truck drivers receive a statutory compensation in sugar. Beet "tolling" formulas, by which beet growing farms receive and (mis) handle most of the sugar processed from their beets appeared in 1990 and gained a dangerous extension. Over 300,000 T of sugar might be produced under this or similar arrangements in Ukraine this year. The "gonzakhaz" or State orders are by-passed to the detriment of the housewives or enterprises whose purchasing power are limited to rubles, coupons or unbarterable goods. Barter formulas also flourished this year for imported white and even raw sugar : buyers could be literally anybody : provinces, towns, factory collectives, individual traders. This leads to double counting, useless hoarding, accentuation of local over - or under - supply situations, in one word, plain waste. One may think that such a mess is limited to the former soviet republics ; no so. It also affects Rumania, to a smaller extent Poland and other areas. In Hungary the Western Groups, lacking even the most basic distribution reporting system, initially complained about an oversupply situation and insisted that the Government take export supporting financial measures and put pressure on the growers to reduce acreage (which they did), only to discover later that consumption was doing far better than they had thought and the final crop year's stocks stood at a dangerously low level in fact.

The path to recovery.....

All this, again, is not beyond remedy, though, and there is hope than the beet and sugar production and marketing system can be modernized fast. The five new Länder of Federal Germany show how one can jump from 3.5 T to 6 tonnes of sugar per hectare in a matter of 2 years.

A similar progress has been made in Hungary (4.5 to 6.5 TS/ha) with the techniques brought by the Western, mostly French groups. Full scale experiments in Ukraine, like the one my firm has been associated with on 20,000 acres of beet in the Tcherkassy Province, show, in a particularly bad year like 1992, results 50 to 80% above the regional average in terms of sugar per hectare. Even in difficult Rumania, the test areas developed by SUCIDEN and the French beet growers have sometimes shown brilliant results. This is not to say that it is so easy : the technological "path" ("itineraire technologique") introduced by the French has proven itself far too high-ec to be adaptable "across the board" to East European conditions. In particular, the small doses of expensive and specific weeds, pests and diseases - killing chemicals did not show much immediate response where the beet farms were used to apply (when available) massive quantities of unsophisticated, but cheap, treatment products. In the case of exporting countries like Hungary, Poland, Serbia, Ukraine and Moldavia growing and processing along the Western Europe pattern may prove too costly for world market - priced sales.

.....but how expensive ?

However, real production costs for export are hidden, to a certain extent, by the extreme rarity of foreign exchange and the ridiculously low cost of wages (about 80 \$/month in some republics) and inputs, and all kinds of effective crossed subsidies on the cost of energy and processing materials.

The same observation is valid for refining. It has seemed obvious to Ukrainian and Russian sugar industries that cane raw sugar could be a cheaper raw material than locally grown beet. Tolling, sometimes done at negative fees, was quite attractive for Russia, Ukraine the Baltic Republics and Kazakhstan in 1992.

How long, however, will these very special economics persist ? This is all the more open to question since Czechoslovakia, Poland, East Germany already went, or are getting, out of refining. This activity may survive, provided it may be sustained with cost below the long term level of the white sugar premium (50 to 60 \$/T), which is doubtful as long as it continues wasting energy (150 kg of heavy fuel/TS) and labour.

The continuation or disappearance of the Russian and Ukrainian refining is one of the major points to watch in the world market of the years ahead. For Cuba it represents by far the major market, a market the E.C. sugar producers want for themselves. There is there a focus of confrontation between the EC and Cuba, which requires from Cuba competitive pricing conditions, to balance the disadvantages of distance, logistics and increasingly less competitive customers, as real economics prevail and beet becomes more competitive.

Refining may appear to some people as just helping an obsolete tool of production to continue working without major investments, under an economy of shortages, and a gross undervaluation of locally produced inputs and labour. As these countries get closer to modern economics, even integration to the Western European model, sugar, as every sector, faces modernization and restructuration, the cost of which is going to be horrendously high in economic and social terms. To give a simple idea of their magnitude, even with yields per hectare still far from the best performing areas in the west, but about twice their present level, beet areas should be cut by 1.5 million hectares.

Similarly, the existing factories, averaging 2600 tonnes of beet per day, should be reduced from 540 to 210 in order to achieve a decently competitive size (see the attached table). Labour force might have to be cut by 75%.

The Eastern Germany case is fairly instructive : there were 43 factories there. The German Groups and Danisco are to keep just 5 of them (3 as thick juice operations, 2 being increased three - fold in capacity) and build 4 brand new and large ones, at a total cost exceeding 1.5 billion \$.

A rush to the East ?

Where all this money could come from is the question. These countries do not have any saving capacity of their own. They are all set to "privatization" but with no capital available, which is to put the cart before the horse. So far, one major solution is emerging : a wide opening to foreign investment. There is in fact a trade-off with Western European sugar groups by which fractions of East European sugar markets are practically awarded to them against commitments to make the production tools modern, efficient and fairly competitive. British Sugar was the first one to throw itself in the cold waters of Poland 3 years ago, followed by Eridania Beghin-Say (Ferruzzi Group), Générale Sucrière with Tate and Lyle, Sugana of Austria with Sudzucker, all of these in the hardly warmer pool of Hungary. Czechoslovakia now follows with the French again setting foot in Bohemia. The Danes seem to be in an expansionist mood as well.

It is too soon to assess the impact of the rush to the East. Certainly, for the involved westerners, it has not been a gold rush so far and the promises are more likely to be "blood and tears" for the Paris, London and Mannheim general staffs in the years ahead. But had they any choice ?

Is there any other option open for the Easterners ? This remains to be seen, as the westerners have mainly restricted themselves to 2 countries so far (Hungary and Czechoslovakia), Poland being considered as a little too "messy". One thing is certain : westerners can be ready to pay a price for a market share, provided there is a market. A market in European language is just the opposite of the wilderness which prevails now (and which is considered by the naïve newcomers as the characteristic, precisely, of a market economy). A market for us Europeans is not just selling sugar, it is a set of rules establishing relationship between beet and sugar prices, minimum stocks, last recourse Government purchase and effective border protection. All this is a set of conditions the relatively weak Governments, successors to the Communist State, have been utterly unable to establish. The strongest deterrent to the large investments required is the absence of stable rules and sometimes the absence of Government.

One solution would be to put the adhesion of our Eastern neighbours to the EC on a faster track. The West has been utterly reluctant to set goals and dates for adhesion, and with reasons I fully understand. But this, in my personal opinion, is to put the Eastern European food sector in the quite awkward situation. Is it normal for them to have their future new Common Agricultural Policy and their international commitments as well, being set by West Europe, and the gaps in techniques, productivity and environment to continue widening, without having their say in what is going to be their daily life, when, they do not know either ?

There is clearly a case for either a faster adhesion process or the establishment of a all-European Common Agricultural market for which integration steps would be established far in advance, along the model set on this side of the Atlantic by NAFTA.

THE WEST : THE URGE TO RATIONALIZE

How large is Western Europe

and how large will the EC become, the answer is not so simple : Sweden and Finland, beet sugar producers and cane refiners, Austria and Switzerland, beet producers, and Norway (not a producer) are all candidates to EC adhesion. Turkey, a very competitive sugar producer, which looks to Asian Republics for fresh sugar markets, is also a candidate, but its presence in the EC by year 2000 is still doubtful.

The newcomers' beetgrowers and processors get a better treatment, price-wise and margin-wise than the EC producers. They will have to adjust to lower incomes. While this is not a problem for the Swedes and the Austrians, the Finns and the Swiss will suffer and ask for adjustment periods and should probably set up deficiency payments.

The GATT

Adjustments are all the more required since the producers are facing constraints resulting from GATT commitments, the new CAP and a new Sugar Regulation now being actively prepared in Brussels.

If the GATT impact might be of substance, it would be, interestingly enough, because of the combination of the existing system of restitutions and a clause in the GATT Secretariat Text by which (I quote from Article 9-1-c)) "payments that are financed from a levy imposed on the agricultural product concerned or an agricultural product from which the exported product is derived" are considered as export subsidies. This is what one should call the EC sugar clause. Try to explain to the EC producers that their sugar exports are subsidized, you will have to make a fast get-away. Certainly it was silly enough for the EC beet and sugar producers to have left the production levy + restitution funding system to survive, while they are 100% world market exposed on all their export sales anyhow, and this system should be reconsidered. On the other hand this GATT clause is absolutely unfair to them and, in my opinion, should have been, or should be, struck out.

On the other side of the EC sugar balance, "parasitic", sporadic, imports may occur at low world market levels if the proposed safeguard clause is maintained. The EC sugar industry points out that the additional duties proposed are totally inadequate in consideration of the special characteristics of the world sugar market, particularly its high short term volatility, which is a fact. I bet with you that any smart trader could beat them easily, as it was the case for the US fees in the 7 dark years of 1975-1982. This position on the safeguard clause is shared incidentally, with, I believe, most of the US sugar industry.

This is understandable considering that GATT disciplines will have impacts on less than 25% of world sugar production, and, in the opinion of the most experienced sugar analysts, will probably increase, not decrease anyhow, the price volatility.

If you have to cut on exports, and even take small tonnages of imports in, the only solution, with limited consumption growth, is to cut production. This is why I consider the EC production and all West Europe's by the same token, as "frozen" for the years ahead. C sugar export production could react to improved world prices, but better world prices are not to be seen in my crystal ball for the next few years.

New CAP

There are other GATT commitments concerning Internal Support reduction. Those however appear to be, for beet and sugar, on line with what is not quite yet on the books, but might very well come, concerning cuts in the guaranteed price.

Here again we have an equation the terms of which are set by the 30% cut in grain prices. Even with HFCS, and now fructose, staying under quotas, it would be a wild proposition to have secondary but important sweeteners costing 15 to 20% less than the major sweetener, sugar. Sugar beets have not yet been put under new CAP constraints (like set aside, lower guaranteed prices and deficiency payments), as Brussels is not particularly keen on hitting a crop which is budget neutral and contributes strongly to maintain a lot of farms in existence, as the other crop's contribution margins trend down sharply. It looks like, however, that new CAP will indeed apply to beet and incomes will suffer.

Lower incomes carry requirements for a degree of deregulation, at least allowing to make the sector as a whole more cost efficient. The allocation of national and company quotas did recognize, to a certain extent, the EC map of competitiveness in sugar production. On the other hand, they have proven to have serious drawbacks. Paying one billion \$, not just for the 7 factories of Raffinerie Tirlemontoise, but in fact for a 600.000 tonnes quota set a bad example, establishing a high price for the necessary restructuring of the EC sugar industry. One should recognize that there are too many factories. And do we need 87 sugar companies to produce 17 million tonnes in Western Europe, when you manage with 7 to produce 3 million ?

This is why, in my opinion, as the quotas are being kept, the new sugar regulation will have to establish ways and rules to allow this 17 million production to move within the large territory of the 17 members EC. I admit that the exercise is far more difficult - and costlier, for the reasons explained above - than moving cane acreage along the coast of Queensland, but it must be done.

The impacts

Certainly, there will be tearful episodes. The EC lost over 100,000 beet farms in the last decade and is set to lose 75,000 more in the years ahead. On the processing side, 64 units were shut down and the rate will probably be maintained at 7 closings per year, maybe more. 40 companies merged or were absorbed.

The social impact is large, but has been properly managed. Staffs have been reduced 40% on average, and the trend accelerates. Labour cost were down by 25%, and energy consumption has been cut by 40%, to slightly above 20 kg per tonne of beet processed in France. While automation, energy saving and capacity expansion so far top the investment list, one has to expect heavy outlays on environment preservation measures which are to take at least 25% of capital expenditure in the years ahead.

The markets for beets

I wish that the Sugar Users, who are advocating a far deeper reform in the E.C. sugar regime, could tell us that with lower prices and smaller exports we are set to have higher consumption. Sugar consumption anyhow is on the rise again, even though we do have a penetration of intense sweeteners (particularly aspartame : 500,000 tonnes of sugar equivalent). The penetration rate is now above 10%, against 5% ten years ago. Situations however differ widely : from 15% in the U.K. (a large consumer of saccharin) to 4% in France, and the penetration is levelling off : last year in France two third of the new food brands were "diet", "light" or "low". We are down to one fourth this year. Apparently consumers do come back to "real", "natural" food : it is not a trend yet, but could well become one.

The new market to be found for beets is the fuel additive market which has at last, with a somewhat reluctant adhesion of the oil refiners, become a serious proposition. The potential is not clear yet, depending of such factors as growing non-food crops on set aside land, but one may say that at least several million tonnes of beets are already "booked".

As domestic consumption hopefully continues scoring better, and exports are frozen to recent levels of 4 to 5 million tonnes of white sugar, a re-direction of exports is being outlined : less sales to the big world, ranging from Venezuela and Mexico to East Africa, India and Indonesia, possibly less as well to the Middle East, more to Mediterranean and European destinations. The EC will still be the major player in the white sugar market, but that leaves large additional outlets for other exporters.

Indeed, the big world market game in the nineties is to be played in Europe. Europe, as a whole, might find itself exporting very little sugar, if any at all, to the rest of the world ten years from now. This will rest with the evolution of Cuba's and generally raw cane sugar competition's with Western and Eastern European beet.

There is another facet to this statement. If some new equilibrium is reached in European agriculture and if any benefit might be found in the integration of all - Europe's agricultural markets, the volumes of world agricultural trade might very well differ from what the GATT negotiation goals are about. One cannot be in favour of the GATT approach, and at the same time push for the regional market approach, of the NAFTA type. Though they are not incompatible, choices must be made to a certain extent, and the impacts of the comparative advantages are not at all the same in each solution. In my view, sugar, like some other agro-industrial products, gives an illustration of how GATT-induced reduction of exports and supports may lead to an acceleration of regional integration, a phenomenon which I would like to see developing rather more on a voluntary and properly timed basis, than forced upon by uncontrolled events on the concerned parties.

EAST EUROPE (17 COUNTRIES)

	NOW (1991/92)	BY 2000
Number of Growers	375,000	300,000
Number without Poland	25,000	15,000
Beet area (Mil ha)	4.2	2.8
Beet sugar Production (MT)	11.7	13.5
Cane sugar refining (MT)	3.5	0 - 3.5
Sugar disappearance	17.0	18.0
Yield TS/ha	2.8	4.5
Number of factories	540	210
Total slicing capacity TB/day	1,400,000	1,250,000
Average slicing capacity	2,600	6,000
Labour force	200,000	50,000
TS/grower	31	45
(whithout Poland)	468	900
TS/factory	22,000	64,000
TS/employee	58.5	270

Source : ERSUC databank

WEST EUROPE (17 COUNTRIES)

	NOW (1) (1991/92)	BY 2000
Number of Growers	375,000	300,000
Beet area (Mil ha)	2.25	2.0
Sugar Production	17 MTWV	17 MTWV
Sugar Refining	1.8 MTWV	1.8 MTWV
Sugar consumption	13.2 MTWV	13.5 MTWV
Yield TS/ha	7.7	8.6
Number of factories	215	165
Number of sugar companies	87	58
Total slicing capacity TB/day	1,500,000	1,500,000
Average slicing capacity	7,000	9,100
Labour force	60,000	30,000
TS/grower	44	56
TS/factory	80,000	100,000
TS/company	200,000	300,000
TS/employee	280	560

(1) Source : CEFS - Includes Former DDR and 0.3 MT of molasses and cane sugar for refining

For Release: Wednesday, December 2, 1992**PROSPECTS FOR SUGAR USE**

Donald W. Westfall
Vice President, Abel, Daft & Earley

There are few people in this room who, when asked to characterize the past 20 years in the sugar side of the U.S. sweetener business, would not use words like "traumatic," "troubled," "difficult," and so forth. As participants in or analysts of the industry it is easy to focus on long-term trend lines that seem ready to fall off the page and not notice that the reality over the past five or six years shows an industry that has made remarkable strides. While the sugar market is indeed "mature," it is also growing at better than twice the rate of population -- a success story many would envy.

Today I am going to talk in as much length as my 10 minute allocation permits about:

- the trends in sugar consumption over the past two decades,
- the reasons for thinking that the recent past has actually been relatively comfortable for sugar producers and refiners -- at least compared to the 1970s and early 1980s,
- the sales segments where the trends are positive and those where sugar's market share has eroded,
- why deliveries are growing in some sectors, and finally
- what lies ahead.

Slide 1: Beet and Cane Sugar Deliveries

In 1971 total sugar deliveries on a refined basis topped 10.6 million short tons and were still rising. By 1981 deliveries were only 9.1 mst. A decade later deliveries of refined sugar had fallen another million tons. The problem was high fructose corn syrup. The remedy favored by the domestic sugar industry and ultimately written into law was to maintain price

support levels but to cut imports of cane sugar. Consequently, over this 20 year period beet sugar output rose in total and its relative importance to the domestic sugar economy increased.

Slide 2: Sugar Deliveries by Form

For a good part of that twenty years the people with the ear to ear grins were corn wet millers. Their business went from being a commodity processing backwater to a high tech success story with a devoted following among Wall Street analysts. All thanks to some enzymes, a couple of big price surges and a price umbrella held high and steady by the domestic sugar program. By 1991 high fructose corn syrup had stolen away virtually all liquid sugar sales.

Slide 3: Sugar Deliveries by Type of Use

Liquid sugar was and is an industrial ingredient, so of course the impact was felt most heavily there. Other forces -- changes in attitudes about sugar, in lifestyles and demographics effectively capped non-industrial deliveries.

Slide 4: Sugar Deliveries for Food and Beverage Use

But snap shots taken at ten year intervals tend to obscure the good news about the past six or seven years. Since 1986, sugar deliveries for food and beverage use have been climbing at better than a 2 percent annual rate. The abrupt reversal of field in 1985/86 should not have surprised anyone. The technical limits of HFCS market penetration were well known and much discussed. The current trend is less easily explained and its duration is anybody's guess. We will come back to that question at the end of my presentation, however.

Slide 5: Sweetener Ingredient Purchases by the Beverage

Let's look briefly at the most important demand sectors to learn where the growth in deliveries has been coming from and to see what insight it gives us about how sustainable that 2 percent rate is for the future. We start with the easy one: beverages. By and large we are talking here about the soft drink industry, but the data also include deliveries to brewers and distillers and for dry beverage mixes. For those who missed it, this is where HFCS mugged sugar. The beverage segment today is virtually a sugar-free zone. Sugar deliveries to bottlers, which had been about 2.5 mst, practically disappeared in less than 10 years. At the same time, all sweetener deliveries for beverage use almost doubled. The initial beneficiary was HFCS. But now, in beverage applications, high intensity sweeteners (HIS) account for roughly 10 times the sweetening power of sugar (on a sucrose equivalent basis). Many would argue that today the market battle lines in the beverage sector are drawn between HFCS and intense sweeteners.

Slide 6: Sweetener Ingredient Purchases by Ice Cream and Dairy Producers

Sweetener use in the dairy complex, which consists of ice cream, ice milk, frozen confections, yoghurt, and the like, has grown significantly during the last two decades. If you stacked all the bars in this chart on top of one another you would see that deliveries rose 44 percent between 1971 and 1991. But sugar producers didn't get to participate in the growth. After bottoming out in 1983 at around 385 tst, sugar deliveries to this segment have stabilized at just over 400 tst annually.

Slide 7: Sweetener Ingredient Purchases by Bakery and Cereal Producers

Sugar producers have benefitted from the rapid growth in consumption of bakery products during the last ten years. The increase has not been as great as for HFCS, which went from about 250 tst, dry basis, in 1971 to around 875 tst last year. Nevertheless, the rise from 1.3 mst in 1981 to 1.8 mst in 1991 has been one of the positive developments for sugar marketers.

Slide 8: Sweetener Deliveries to the Confectionery Industry

Finally, we come to confectionery -- the most rapidly growing area of industrial sugar use. Since 1981 sugar use by candy makers has increased at an annual rate of 2.87 percent. Compared with sales of other sweeteners to confectioners this has been positively explosive growth. As this slide shows, corn syrup, the second category by volume of deliveries, was just about static during the same period. Why the increase for sugar? Low cocoa prices and fierce competition between manufacturers in the last few years have played a role. But standards of identity and the functional characteristics of sugar have also been important. In many confectionery uses you just can't replace sugar, either because currently available substitutes aren't as good or because the regulations won't permit it.

Slide 9: Share of Total Sugar Deliveries Accounted for by Non-industrial Users

So far we have focused on industrial use. But as the size of the sugar market shrank in the early 1980's the relative importance of non-industrial sales to wholesalers, jobbers, retail grocers, and chain stores grew in importance. In 1980 those markets accounted for just 34 percent of deliveries. Today they hover around 45 percent of sales volume. This is what the data say. I will talk about whether this is a wholly accurate view in just a moment.

Slide 10: Sugar Deliveries for Non-industrial Use, 1980-1991

This slide shows trends in non-industrial deliveries to the wholesale trade and to retail outlets over the past decade. While deliveries to wholesalers and jobbers have trended upward, retail grocer and chain store deliveries have been on the decline. This is partly a function of

choosing 1980 as a beginning point. High prices in the first year of the series appear to have influenced the delivery patterns to the two groups in different ways. Choosing 1981 as a base year yields a less positive growth rate for wholesalers (0.5 percent) and eliminates the negative slope of the trend for retail deliveries.

Slide 11: Sugar Deliveries for Non-industrial Use 1988-1991

But if we zoom in on the past four years an entirely different picture emerges. Now we find deliveries to grocers and chains growing at a very respectable rate and the wholesale/jobber trade dead in the water. As I looked at these figures I had to wonder why the refiners and processors we talk to are always complaining about how terrible the retail market is. No one ever seems to mention strong deliveries of branded or private label sugar.

Slide 12: Annual Average Change in Sugar Deliveries By Segment, 1986-91

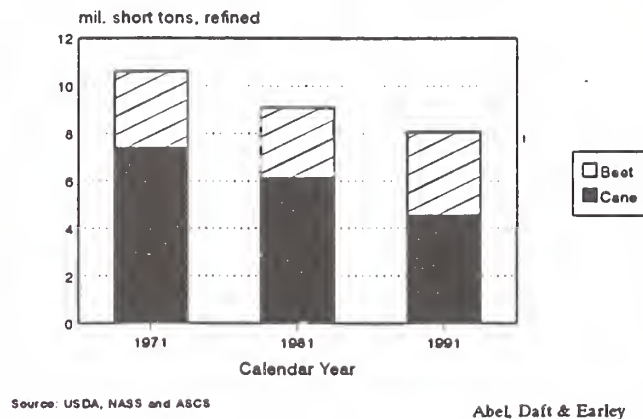
This chart helps explain why. In the bottom half of the figure, you can see that on average deliveries to chains and retail grocers have been rising faster than 2 percent a year since 1986. But deliveries in consumer-size packages have been falling by more than 2 percent a year. Even if we make a generous allowance for repacking by wholesalers and jobbers, the pattern is perplexing. I think the explanation for this apparent contradiction lies in the way deliveries for chain store manufacturing are reported. After surveying a group of refiners and processors and talking to the people who actually fill out USDA's forms, it looks like several companies, but not all, assign any delivery to a retail chain to the non-industrial category, even if it is a bulk shipment to a manufacturing facility that will turn out ice cream or cookies. As a result deliveries for industrial use are probably understated in the USDA figures. The dairy segment may actually be experiencing positive growth. And sugar deliveries for baking, which is an increasingly important chain store activity (in-store and at central locations), may be growing as rapidly as the confectionery segment.

I will conclude by emphasizing again a point alluded to in my introduction. No matter how you cut it, the past five years have been a period of strong growth in deliveries. The last bar on this chart shows population rising at less than 1 percent a year. But deliveries, both industrial and non-industrial, have exceeded 2 percent a year. Margins may not always have been ideal, but efficient producers are enjoying a measure of success.

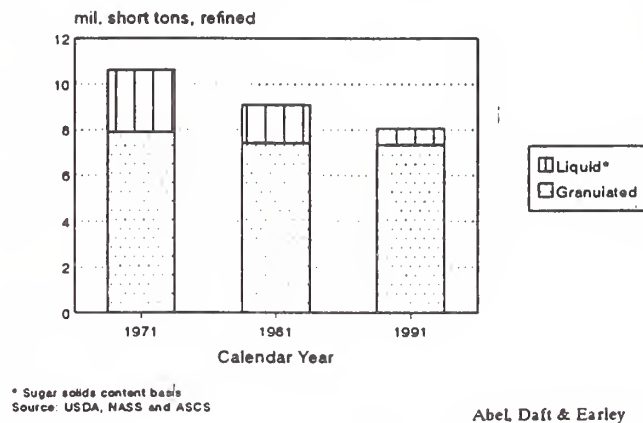
One could argue that the reason for the growth in deliveries is to be found in the lower prices that have prevailed in the market during most of this period. Others have suggested that increasing immigration from countries where high sugar consumption is the norm may be fuelling the growth. Another possibility is that demographics -- the baby boom echo, for example -- may be a contributing factor. Let's take the safe way out and say that it is some of each.

Will it continue? I think so, because I think the sugar industry is intent on holding down costs and remaining efficient and because industrial users have neither adequate substitutes for sugar in many applications nor the urgent incentive in the form of impending price increases to pursue expensive alternatives. This is an uneasy stability -- a truce, if you will -- that could crumble under technological or political pressure, but for the next few years I believe we can expect continued vigorous growth in sugar deliveries.

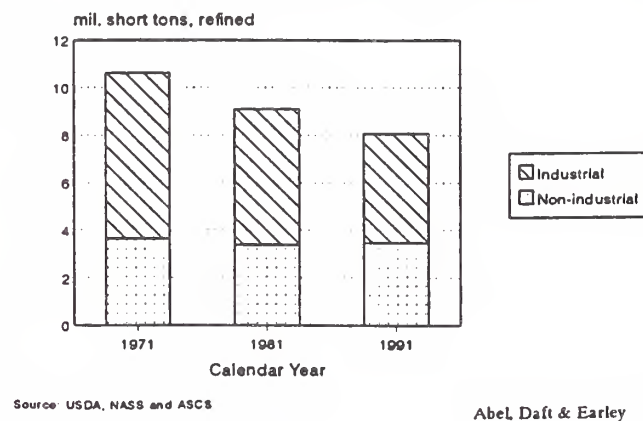
Beet and Cane Sugar Deliveries



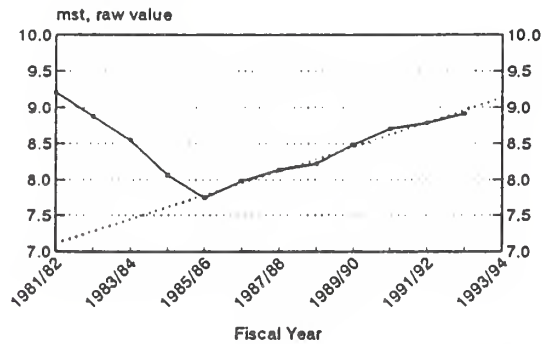
Sugar Deliveries by Form



Sugar Deliveries by Type of Use



Sugar Deliveries For Food and Beverage Use

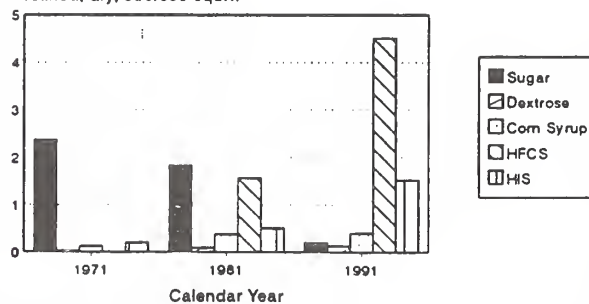


Source: USDA, ERS

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Sweetener Ingredient Purchases By The Beverage Industry

mil. short tons,
refined, dry, sucrose equiv.

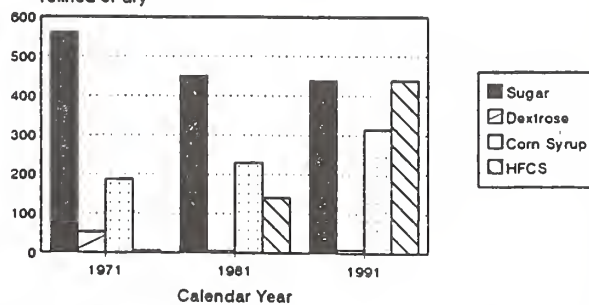


Source: USDA, ERS

Abel, Daft & Earley

Sweetener Ingredient Purchases By Ice Cream and Dairy Producers

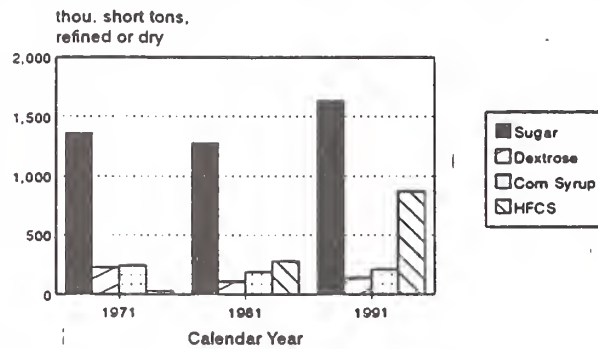
thou. short tons,
refined or dry



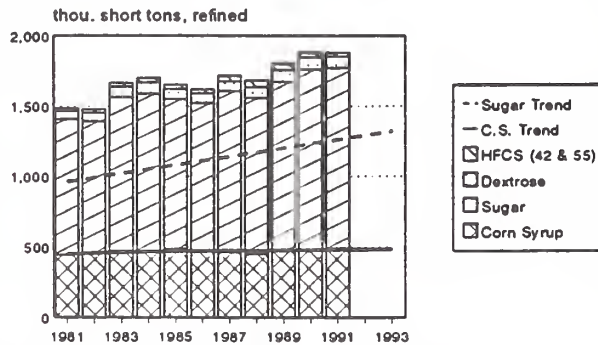
Source: USDA, ERS

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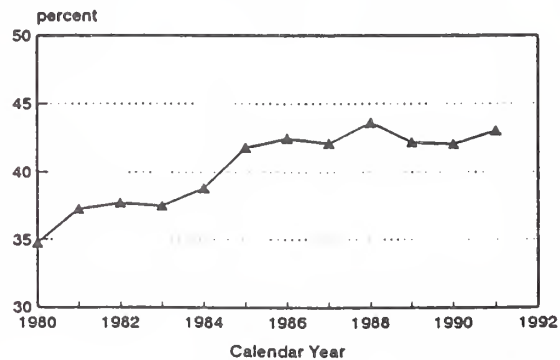
Sweetener Ingredient Purchases By Bakery and Cereal Producers



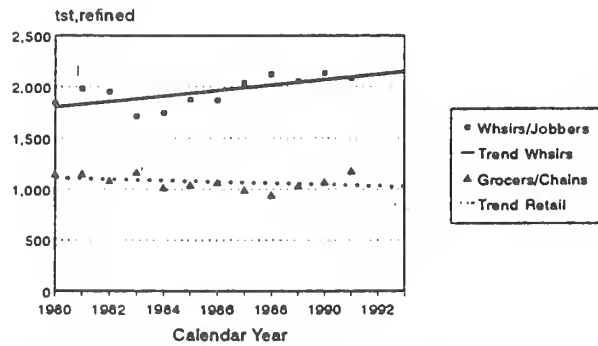
Sweetener Deliveries to The Confectionery Industry



Share of Total Sugar Deliveries Accounted for by Non-Industrial Users

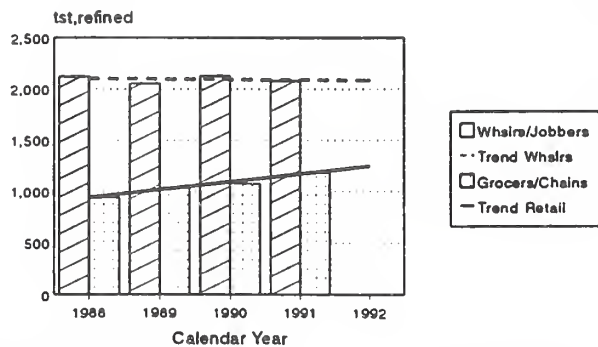


Sugar Deliveries For Non-Industrial Use 1980-1991



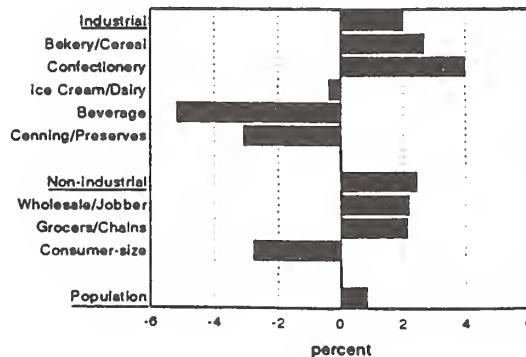
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Sugar Deliveries For Non-Industrial Use 1988-1991



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Annual Average Change in Sugar Deliveries By Segment, 1986-91



Abel, Daft & Earley



United States Department of Agriculture
Washington, DC 20250-3900

Outlook '93

For Release: Wednesday, December 2, 1992

PROSPECTS FOR USE OF HIGH INTENSITY SWEETENERS

Max Downham
Vice President, Mission & Strategy
The NutraSweet Company

Good afternoon. On behalf of The NutraSweet Company, and the high intensity sweetener industry, it is my pleasure and privilege to be a part of this afternoon's Prospects for Sweetener Use panel.

I've been asked to address the current situation regarding the global high intensity sweetener market, and, more importantly, the outlook.

THE CURRENT SITUATION

In reference to the global sweetener market, the figures I'm going to share with you are from 1990, which are the latest available. These market estimates were developed by Landell Mills Commodities Studies.

On a global basis in 1990, we consumed 110 million tons of sugar...and, expressed in sugar equivalent terms, 10 million tons of high fructose corn syrup...10 million tons of variety sugars...and 6.0 million tons of high intensity sweeteners. High intensity sweeteners, therefore, accounted for just less than 5 percent of the global sweetener market overall (refer to Exhibit 1 attached).

Within the global high intensity sweetener category, saccharin led the way with the sugar equivalent of 3.4 million tons. Aspartame followed with the sugar equivalent of 1.7 million tons, with aspartame continuing to be the fastest-growing global player in the high intensity sweetener category (refer to Exhibit 2 attached).

Cyclamates accounted for less than half a million sugar equivalent tons. And all the others came in at under 100,000 pounds.

When you look at the sweetener market on a world region-by-region basis, you find that aspartame leads the way in the U.S. and Australia, and is also quite popular in Europe and Canada. And, based on these 1990 data, saccharin is clearly still the favorite in China.

Focusing on the United States for a moment, overall growth of high intensity sweetener use in the United States has continued at a significant level, driven largely by broad consumer acceptance of products containing aspartame and, to a lesser extent, by the relatively recent availability of acesulfame-K.

Some of the fastest growing product categories for high intensity sweeteners include tabletop sweeteners, yogurts, frozen dairy desserts, chewing gums, and -- until quite recently -- diet carbonated soft drinks.

In reference to the carbonated soft drink category, I have been asked to address the much discussed interruption in the remarkable historic growth rate of the diet soft drink category in the U.S. We believe, that a number of possible reasons exist and, while our customers could probably give a better insight, I will share our viewpoints.

The first, and possibly most significant factor, is the economic slowdown over recent months. Consumers have certainly been more cautious in their spending. Some data indicate correlation between GNP movements and the rate of growth of soft drink sales.

A second factor, perhaps, is the cooler-than-normal summers that we have experienced.

And, consumers have been confronted with a variety of niche products that are alternatives to carbonated soft drinks, including sparkling and still waters.

Obviously, other considerations exist. Perhaps of most importance, we believe many of these factors are temporary and that the diet soft drink category will probably resume something similar to its historic growth rate.

And, before moving on to the outlook for high intensity sweeteners, I have also been asked to address briefly The NutraSweet Company's reaction to the expiration of the aspartame primary use patent in the United States, just twelve days from now.

Because we have planned for the expiration, December 14 will be a non-event for us, although I can well imagine that some of our competitors might well view this differently.

We are optimistic about our future! We are continuing to experience process engineering breakthroughs which significantly reduce production costs. We are committed to remaining the low-cost aspartame manufacturer on a global basis!

Also, we are investing heavily in building increasingly strong partnerships with our customers. For example, we are working closely with our customers to define exactly how our ingredients can be better and more economically introduced into their manufacturing processes, and at the same time, provide better tasting products for their consumers.

In summary, we intend to increasingly deliver more value per dollar invested to our customers and their consumers, whether this value relates to taste, nutrition, consumer confidence, cost, or, any combination thereof.

We will continue to deliver a quality product in a reliable manner. The NutraSweet logo symbolizes uncompromising quality, and consumers know that they can trust products that carry our name. We will continue to compete with -- excuse the pun -- high intensity.

THE OUTLOOK

What about the future? By the year 2000, we believe all intense sweeteners on a global basis will account for more than 12 million sugar equivalent tons. Sugar consumption itself will increase to 130 million tons. Given these projections, intense sweeteners will account for about 7% of the total world sweetener market.

On a world basis, aspartame will continue to experience tremendous growth during this period. We predict a doubling of the aspartame market in the U.S. and Europe, a tripling of the market in Asia, and growth by a factor of five in Latin America.

In brief, we believe the size of the future opportunity -- the outlook, if you will -- to be immense! Of course, the nature and size of the opportunity will vary from region to region around the globe.

Why such optimism? The overall premise for this outlook is this: As tens, if not hundreds of millions of people world-wide become more health-conscious, or, perhaps better stated, more longevity-conscious, so too are they becoming more nutrition-conscious as a result. Consumers, in general, especially older people -- an increasingly larger percentage of the population are becoming more diet conscious and more likely to consume fewer calories in the future. This nutrition consciousness is the basis for the opportunity.

As a result, the already growing demand and applications for high intensity sweeteners in soft drinks and foods, that I mentioned a few moments ago, will continue. And, the number of new food and beverage applications will continue to increase.

And, the outlook for high intensity sweeteners is bullish because new and better high intensity sweeteners, in all probability, will be developed and brought to market. The NutraSweet Company, as you may know, is developing a new, very intense sweetener, called Sweetener 2000, which is expected to be approved by the end of this decade.

Sweetener 2000 is 10,000 times sweeter than sugar, tastes just like sugar, and promises excellent stability in all possible applications. This sweetener could literally change the way the world thinks about sweeteners.

Finally, we believe that a strong possibility exists that many health-conscious consumers, may, in the future, want a compromise between the "no calories" of the high intensity sweeteners and the higher calories of sucrose and fructose. This potentially significant consumer demand makes way for an application that perhaps has not yet received much thought. I am referring to the possibility for blends of high intensity sweeteners, like NutraSweet, with sucrose or fructose. These blends can translate into fewer calories, sweet taste, economic advantage for food and beverage processors, and, overall, many new and exciting product applications that provide a variety of consumer benefits.

In summary, the high intensity sweetener industry faces a bright future. It is a future where increasing collaboration with sugar and fructose producers will, in many instances, supplant the more traditional competitive positionings. This challenge is energizing to say the least and I am confident that the type of dialogue stimulated by this conference can serve all of us well as we move forward together into the future.

Thank you.

1990 WORLD SWEETENER CONSUMPTION
(IN SUGAR EQUIVALENT TONNAGE)

SUGAR	110.0 MILLION TONS
HIGH FRUCTOSE CORN SYRUP	10.0 MILLION TONS
VARIETY SUGARS	10.0 MILLION TONS
HIGH INTENSITY SWEETENERS	6.0 MILLION TONS*

*EXCLUDES SACCHARIN TONNAGE FOR NON-FOOD USES

REGIONAL SWEETENER CONSUMPTION
1990
(SUGAR EQUIVALENT TONS, ADD 000)

	<u>SACCHARIN</u>	<u>ASPARTAME</u>	<u>CYCLAMATES</u>	<u>ACE-K</u>	<u>STEVIA</u>
EC	1011	195	65	22	0
EUROPE/NON-EC	73	38	23	2	0
CANADA/US	250	1319	30	7	0
LATIN AMERICA	207	25	51	0	4
AFRICA	41	16	3	0	0
CHINA	1617	1	1	0	0
ASIA EX-CHINA	987	60	289	1	31
AUSTRALIA	20	46	3	0	0
REST OF OCEANIA	28	1	2	0	0

- BY THE YEAR 2000 -

INTENSE SWEETENERS WILL ACCOUNT FOR:

- 0 12 MILLION SUGAR EQUIVALENT TONS
- 0 AND REPRESENT ABOUT 7% OF TOTAL WORLD
SWEETENER MARKET

- BY THE YEAR 2000 -

ASPARTAME ON A WORLD BASIS WILL:

0 DOUBLE IN USA AND CANADA

0 TRIPLE IN ASIA

0 INCREASE BY FACTOR OF FIVE IN LATIN AMERICA

THE GENERAL OUTLOOK

- 0 CONTINUED GROWTH IN EXISTING APPLICATIONS
- 0 NEW APPLICATIONS
- 0 NEW HIGH INTENSITY SWEETENERS
- 0 BLENDS

Presented at the Outlook '93 Sweeteners Dinner, December 2, 1993

The View from Guangzhou:
Reflections on China's Sweeteners Industries

Phil Shull
Foreign Agricultural Service
U.S. Department of Agriculture

The View From Guangzhou- Reflections on China's Sweeteners Industries

Good Evening. It is an honor for me to be here tonight to talk with you for a few minutes about the sugar and seetener situation in China.

Rather than taking up lots of time discussing things you may not find relevant, I would rather discuss your specific interests. Therefore, I'd like to spend the next 15 or 20 minutes giving a broad overview of the sugar situation in China, and where I think it's likely to go, and then answer the questions I can for as long as you like.

The Chinese have a saying, "The only rule that never changes is, 'Things Always Change'." That certainly holds true for the sugar situation in China over the past five years. It has been a series of peaks and valleys for production, trade, and stocks. The only figure that has not been all over the place is consumption. While some analysts have disagreed, I continue to maintain sugar consumption in China has increased every year since the early 1980s- sometimes sharply, sometimes more gradually, but always up. In fact, the rate of increase has probably been slower over the past couple of years than at any time in the last ten.

Before I get any further into the specifics of the sugar situation, allow me to give you the economic context in which these fundamental changes are taking place. The improvements in living standards which China has achieved for most of its urban and much of its rural population are truly phenomenal. When I first lived in China eleven years ago almost all foods and many consumer items like soap and cotton were rationed. The waiting period for a bicycle was two years, many in the "Middle Class", including my professor colleagues, wore patched clothes. The Bathroom was down the street and kitchens were shared by two or three families. There was no hot running water and the standard light bulb was 15 or 25 watts. Many thought I was rich because I had a wrist watch.

When I returned five years later, it seemed everyone had five or six watches and they all wanted to sell me one. Now you see almost no one in the city with patched clothing. Everyone is wearing bright colors and fashionable styles. Nintendo is the rage. While housing is still terribly crowded by our standards, virtually every home is packed with a television, a camera, a stereo, and a washing machine. Commensurate improvement in diets and diversity of diets has taken place over this period as well. Such are the achievements of rocketing disposable income, and an economy growing at an estimated rate of 11 - 15% per year. In Guangdong Province, the economy (GVIO) has grown by an average of 20 percent per year over the past decade, and by 27 percent in 1990 and 1991.

The explosion in incomes allowed the government to gradually dismantle the food rationing system, gut the longstanding "two-price" policy for most commodities (a low quota price paid to producers or by consumers for a specified "quota" amount, and a higher price for quantities beyond that amount), and fundamentally alter the procurement and distribution system. In 1990 China spent approximately 14 percent of its budget on food subsidies for urban consumers. I personally estimate that figure for 1992 will fall to 4 or 5 percent.

Now, how have these changes affected the sugar industry, and what is the outlook for sugar consumption, production, and trade?

Ironically, the area in which I feel most confident of my prediction is Consumption-- that's because there are no official statistics for that category so I can't be proven wrong. The Chinese government puts per capita refined sugar consumption at about 6.5 - 7 kgs per person. With China's official population statistic of 1.13 billion (which I believe is significantly less than the actual population) that makes for annual consumption of about 7.2 - 7.7 million metric tons. I would look for that amount to at least double in the next 5 - 10 years. Now, how can I predict consumption will double by the year 2000 when I just said moments ago that consumption increases are flatter now than at any time throughout the 1980s?

There are two critical points which I believe are fundamental to doing accurate commodity and market analysis on China:

- 1) Look at the trees rather than the forest.
- 2) China is only now just beginning to emerge as a true economic market.

The way to get exactly the wrong picture of what China is and where it is going is by taking a World Bank book of statistics - or the PS&D of an agricultural attache's sugar report- and running a trend line through it: Per capita income of \$350 per year/ average sugar consumption of 6.8 kgs and holding, / average egg consumption of 12... Looks like a pretty poor, backward country whose screwed up policy has created an annual sugar surplus that will be dumped on the market every year for the foreseeable future when their sugar per capita consumption is way below the world average.

In fact what you have is an urban and suburban population of perhaps 100 million people earning \$1200 a year, and consuming 18-20 kgs per year and eating 100 eggs, and then another 100 - 150 million earning about \$700/year consuming about the same. Then you have about 500 million people earning and consuming at the per capita averages, and the bottom 300 million or so consuming substantially less than those

averages. This is especially important for a processed food products containing sugar which get fairly limited distribution. The vast majority of these products are consumed in cities-- which is why China is experiencing such a huge "surplus" of sugar at the moment, and why it exported over 1 million tons of sugar this year. The city folk just can't eat any more. That market is saturated. They've got all the pop and biscuits and candy they can eat.

Suddenly things like infrastructure and domestic marketing policy begin to look very important to the outlook for consumption and trade. Obviously, China has the capacity for a huge increase in sugar consumption; the Chinese have a tooth every bit as sweet as the rest of us. The question is How and When will this latent demand be met?

I believe it will be met through the continued development of China's infrastructure; specifically transportation and production and processing capacity. I think we need not worry about whether the economic demand will be there. The economic growth engendered by improved access to markets will be more than enough for everyone in these villages to buy a couple boxes of cookies. The Chinese government is firmly committed to economic growth through a market economy- and letting the market work its magic.

When will it happen? My prediction is that extremely rapid development of most of China's rural areas will take place over the next 20 years. Where the 1980s was the decade of explosive growth for China's urban and coastal areas, the 1990s and first decade of the next century will see that explosive growth extended to interior cities and rural areas. One can see this happening already. In my travels to smaller cities and villages in interior provinces, I was surprised by the diversity of processed products in the stores and markets.

My second critereon for doing accurate commodity forecasting for China was to recognize China is only now emerging as a major ECONOMIC market for its own, as well as foreign producers. For a century and a half we in the West have been mesmerized by the prospect of "The China Market" because of its huge population. The trouble was only a small fraction of that population had any money. Only now is there a strong commercial market developing-- because only now are there significant numbers of people with the means to purchase things they want or need. It is absolutely incorrect to see China as a "market" of 1 billion plus people. Rather, it is a market of 100 - 150 million people which I believe will grow by 10 percent (in number) through at least the end of the decade- a condition which has enormous implications for Chinese demand for a wide spectrum of goods.

Rather than spout statistics, simply consider this- Taiwan is one of the worlds's largest importers of U.S. high value agricultural products. The population of Shanghai alone is nearly half that of Taiwan. The total population of China's four largest cities exceed the population of Taiwan and Hong Kong combined. NOW is the appropriate time for our businesses and our government to become mesmerized by the huge potential of the China market- and to take actions which will maximize our exports there.

Changes in Sugar Distribution and Procurement and the Implications for Production

Before 1991, both farmers and sugar mills had a guaranteed market and price for their product. The mills were required to purchase all the cane or beets farmers produced at a state-set price that varied somewhat from place to place. Refineries then sold to provincial Commercial Bureaus a quota amount at a low fixed price, and the above quota amount either on the free market or to the Commercial Bureau for a higher price- or for internal use in its own food processing/bottling operations.

In 1991, for a variety of reasons which we can go into later if you like, the sugar procurement policy was completely changed. The quota price for refined sugar was eliminated, and refineries could sell to whomever they chose. Good deal, right? But the catch was the Provincial Commercial Bureaus were no longer forced to buy all the sugar the mills produced. Suddenly the mills had to market and store their entire production. This has thrown many mills into chaos - but it is a chaos that most of the managers welcome. Most managers said while they are facing a big adjustment and big capital outlays for building storage facilities and sending marketing people around the country, they believe they will be better off in the long run.

I think the big jump in Chinese white sugar offerings this past year is a direct result of this change. But the mills have an incentive and great opportunity to market this sugar domestically-- partly because of the hassles in getting an export license, and because in

most cases the mills will get a higher price on the local market. Of course, geography plays a big role; obviously the substantial number of sugar growing regions near borders or ports may find it easier to export. But it is certain mill managers will be big advocates of speeding up the pace of infrastructure development.

One problem afflicting the mills is the government mandate stating mills should pay beet and cane farmers the official "guide" price for their crop in the current environment of rapidly falling market prices. The market price has dropped by nearly 40 percent over the past three years while procurement prices have risen by about that amount over the same period. In most cases this policy is almost impossible for the mill to carry out because of another "reform" policy implemented in 1991 called the "Self Responsibility for Profits and Losses" which basically eliminated payments ("re-imbursements) to State-run enterprises that lost money. Most mill managers have said they are now simply unwilling and unable to pay these guide prices to cane and beet farmers. However, there are always exceptions. One mill manager in Xinjiang Province in NW China told me he must pay about 10 percent more than the procurement price to keep farmers growing beets and not cotton. It is likely sugar production will vary to some extent from year to year as farmers with the option to grow other crops react to price signals.

TRADE

China's sugar trading system is also likely to change fundamentally over the next several years. Up till now sugar has been traded by the government's trade monopoly, the National Cereals, Oils, and Foodstuffs Import/Export Corporation. Most China analysts agree, and certainly the bulk of opinion among Chinese officials is that sugar trading authority will be decentralized in the very near future. While would-be exporters or importers will still need to get a license for each shipment, the number of organizations who may receive them will be significantly increased.

As far as trade trends are concerned, assuming relatively stable production, I would not be surprised to see exports remain around the 1 million ton range for the next couple of years- until demand for sugar increases due to a combination of rising domestic demand, and possibly a growing export market for Chinese processed foods. In the long run, I believe China will remain a net importer of sugar.

Whether those net imports remain on a fairly modest scale, or China becomes the largest sugar importer in the world will largely depend on government decisions on further development of the high intensity sweetener industry. Much to the consternation of the sugar mill managers who were constantly asking me for articles denouncing

high intensity sweeteners as a health threat, we estimate current high intensity sweetener production (mostly saccharin) to be equivalent to as much as an additional 6 million tons of sugar.

Finally, let me dispell a common myth -- that because China is a communist country there is a high degree of central control, and that any policy pronouncement in Beijing is immediately adopted in a tiny village in Inner Mongolia. In fact, China is surprisingly decentralized. The Chinese even have a millenia-old saying for this, "God is in His Heaven, and the Emperor is far away." The best example I experienced of this involved China's policy of land tenure. Beijing has a very clear policy: no land contracts for less than 15 years, and the amount of land contracted should bear no relation to family size. During one trip to the hinterlands of Fujian Province I asked a local agriculture official about their land tenure system. He said, "Most land contracts are from 3 - 5 years and are based on family size." Before I could even decide whether to inform him he was out of step with the program, he said, "Of course, this does not follow Beijing's policy at all, but Beijing's policy is not practical here."

The lesson here is, just because Beijing announces a policy, don't assume its immediate and "snap-to" implementation. It may vary greatly in form and substance in its manifestations and incarnations around the country -- including that of the status quo.

Conclusions:

Before I take your questions let me review the three things I hope you'll take from this talk:

1. The economic situation in China has fundamentally changed. While not yet a market of one billion people in the economic sense, it is surely a market of 100-150 million and growing rapidly.
2. When analyzing developments in China, look at the trees rather than the forest. Most urban consumers have a diet every bit as good as in any western country. Watch for this to spread to rural areas where the bulk of China's population lives.
3. As is the case with other commodities, the sugar procurement and distribution system has fundamentally changed, and the trading system is about to. All will now be based much more on market forces.

Thank you.

Outlook '93

For Release: Thursday, December 3, 1992

FOOD GUIDES OF THE 20TH CENTURY

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Nutritionists in Federal Government have advised Americans about what to eat for good health since the late 1800's. The advice has changed over the years as food supplies and food consumption patterns changed and new information on how diet affects health became available. Despite such changes, however, variety, balance, and moderation have remained the cornerstones of dietary guidance.

Tools to help the public choose healthful diets have been developed. These tools have been designed to conform to dietary standards for healthful diets set by nutrition authorities, using information available at the time on human nutritional requirements and the relationship between diet and disease. Examples of such standards are the Recommended Dietary Allowances and the Dietary Guidelines for Americans.

Dietary guidance tools of the 20th century have been of two main types--food plans and food guides.

Food plans define the amounts of foods to buy and use in a week. Plans at different levels of cost are designed for men, women, and children to meet their different nutritional needs. These food plans are useful for determining how much food to buy and for estimating how much food will cost. But most educators find food plans too complicated for the public to use in choosing diets, unless the plans are translated into food as eaten.

Food guides are the more straightforward and popular type of guidance. They suggest the number of servings of various kinds of foods to eat in a day for a good diet.

Both food plans and food guides suggest the amounts of food from various "food groups." Foods are put into groups depending on several factors, such as the nutrients they provide, their use in meals, and possibly their cost.

How It All Started

Wilbur O. Atwater, pioneer nutrition investigator and the first director of the Office of Experiment Stations in the Department of Agriculture (USDA), laid the ground work for dietary guidance. In 1894, he suggested a diet to

meet the nutrient needs for the "average" American male at "moderate muscular work."

In planning this diet, Atwater used the same types of information as others would later use: dietary standards, the nutrient content of foods, food consumption patterns, and the relative cost of nutrients in foods. Information on nutrient needs and nutritive content of foods in 1894 was limited to a few food components--protein, fat, carbohydrate, mineral matter or ash, and fuel value (calories). Foods generally available were relatively few and unprocessed compared with current food supplies.

Atwater noted the importance of moderation in diet. He cautioned, "We waste food in two ways. We throw away a great deal, and many of us eat more than we need. That which we consume in excess of our needs is worse than wasted, because of the harm it does to the health."

The 1910's and 1920's

Through continuing research more minerals and vitamins in foods were discovered and their value in the diet was better understood. By the 1920's diets sufficient in calcium, phosphorus, iron and iodine could be developed. Several foods that contain vitamins A, B complex and C had been identified, although amounts the body needed were not yet known.

Using this information, Caroline L. Hunt of USDA's Department of Home Economics developed practical guidance for the homemaker. She described a well-balanced diet from five groups of foods classified by their nutritive content and use: (1) vegetables and fruits; (2) milk, meat and other foods for complete and efficient protein; (3) cereals; (4) sugars and sugary foods; and (5) fats and fat foods. She described the desirable balance among food groups by the proportion of calories each should provide in the diet.

Hunt's guidance assumed that most of the foods in a group were interchangeable in the diet. Individuals could choose foods they liked--and could afford--from each food group. This rationale for the use of food groups in dietary guidance has continued to the present.

Depression Years

In the early 1930's, families distressed by drought and depression needed advice on how to select economical fare. To help meet this need, Hazel K. Stiebeling, a food economist in USDA's Agricultural Research Service, developed family food plans suggesting quantities of 12 groups of foods to buy to provide nutritious diets at four different cost levels. These food plans recognized that some groups of foods, such as cereal foods, potatoes, and dry beans, supply nutrients more cheaply than others.

Stiebeling stressed the importance of balance between two types of foods. "Protective foods" furnish essential nutrients, such as milk for calcium and vegetables and fruits for vitamins A and C. High-energy foods such as fats and sweets, are desired for calories and palatability. Like earlier

investigators, she developed the dietary standards for her guidance from basic research on nutritional requirements.

The Early 1940's

In 1941, the Committee on Food and Nutrition of the National Research Council (NRC), first published the Recommended Dietary Allowances (RDA)--the amounts of calories, protein, two minerals, and six vitamins recommended for individuals in 17 categories defined by sex, age, and activity. These and later RDA were used as dietary standards in the development of dietary guidance.

The NRC Committee presented a food guide, developed with USDA's help, to show how the 1941 RDA could be met. The guide showed amounts to eat each day from nine food groups: Milk, eggs, meat, vegetables, fruit, potato, butter or fortified oleo, cereal and bread, and sugars.

World War II

With World War II came the rationing of some foods--meat, sugar, butter, and canned goods. Because of rationing and evidence from national surveys that many Americans had poor diets, several branches of government jointly issued "The Basic Seven" as the National Wartime Nutrition Guide. The earlier nine food groups became seven: eggs were put in the meat group and sweets were omitted. Rather than numbers of servings of food groups, this guide suggested alternate food groups to select from when foods from a group were scarce.

In 1946, after the war, "The Basic Seven" formed the basis of the "National Food Guide" published by USDA. This food guide did suggest numbers of servings. Related guidance, even in the 1940's stressed the importance of four types of foods: Milk; vegetable and fruits; eggs, meat, poultry, or fish (sometimes dried beans and peas); and bread, cereal, cookies, and cakes.

The Basic Four

In 1957 Esther Phipard and Louise Page, nutritionists in USDA's Agricultural Research Service, presented the rationale for a new guide with four food groups in "Essentials of an Adequate Diet." After extensive review, "Food for Fitness--A Daily Food Guide," was published in 1958.

The Daily Food Guide specified a foundation diet made up of minimum numbers of servings from four food groups. Predictably it was nicknamed the "Basic Four." This "Basic Four" food guide, with only a few small changes, was the centerpiece of nutrition education for Americans for the next two decades.

The guide's underlying premises were (1) that eating a foundation diet of the nutrient-dense foods as called for in the guide would ensure a diet with a major share of the RDA and (2) that most individuals would eat more food than the guide called for to satisfy their calorie needs and bring nutrient levels closer to the RDA.

Nutrients found to fall short of the RDA in American diets by national surveys at the time were vitamins A and C and calcium. Thus, the guide stressed good sources of these nutrients from the vegetable, fruit, and milk groups. The meat group featured animal protein sources and dry beans and peas, important for their contribution of iron and B vitamins.

The Diet-Disease Connection

By 1970, the importance of diet in the prevention of some chronic diseases was recognized. For example, considerable although controversial, evidence linked diets with too much fat, especially saturated fat, to heart disease. A USDA booklet for consumers, "Fats in Food and Diet" described this relationship in 1974.

Over a decade earlier, USDA had considered fatty acids, as well as total fat, in its 1962 revision of the family food plans. In these plans designed to meet the 1958 RDA, fat provided 35-40 percent of calories and ratios of fatty acids were published.

These and later USDA food plans with lower levels of fat have been used as standards of food use and food cost for government policy purposes. For example, the cost of family food, based on the 1962 Economy Food Plan, is used in the formula for the official count of the nation's poor. The cost of food in the Thrifty Food Plan has served as the basis for benefits in the Food Stamp Program for almost two decades. Foods in the plan have also been used to show how families can get a good diet within benefit levels provided by the Food Stamp Program.

The Dietary Goals

In 1977, the U.S. Senate Select Committee on Nutrition and Human Needs, concerned that the diets of Americans put them at risk for chronic diseases, issued the "Dietary Goals for the United States." The Goals were dietary standards for fat, fatty acids, cholesterol, carbohydrates, protein, sugars, and salt.

The Dietary Goals were controversial among nutritionists and others. Because of this controversy and studies showing that major changes in average diets were required to meet the Goals and the RDA, the Goals were not adopted for use in nutrition guidance. Even so, they drew attention to the need for guidance that more adequately considered prevention of chronic diseases as well as nutritional deficiencies.

In 1979, USDA presented the "Hassle-Free Guide to a Better Diet." This guide added to the Basic Four a fifth food group--fats, sweets, and alcohol--to highlight foods targeted for moderation. "Food", the booklet presenting the Hassle-Free Guide, told how to moderate calories, fat, and sodium in diets and how to consume more dietary fiber. But the guide itself, like the "Basic Four," was for a foundation diet, not the total diet. This type of guide,

when used alone, was no longer a reliable tool for describing healthful diets because it did not show how to keep fats, sodium, and sugars at desired levels as well as how to meet nutrient needs.

The Dietary Guidelines for Americans

In 1980, USDA and the Department of Health and Human Services (DHHS) jointly published the first edition of a new type of dietary standard--"Nutrition and Your Health: Dietary Guidelines for Americans." These seven guidelines called for a diet of a variety of foods that provided essential nutrients and adequate starch and fiber, maintained ideal weight, moderated the use of certain food components--fat, saturated fat, cholesterol, sugars and sodium--and cautioned about alcohol use.

The Dietary Guidelines made it clearer that a new food guide--one for a total diet--was needed. USDA developed such a guide, first used in an American Red Cross nutrition course in 1984 and later in USDA publications that helped the public put the 1985 Dietary Guidelines into practice. Materials and systems of presenting this guidance were tested for their effectiveness with users.

The new food guide's five nutrient-dense food groups, with suggested numbers of servings, were included in the 1990 Dietary Guidelines to describe a varied diet. Advice on how to choose a diet to maintain healthy weight, to choose a diet low in fats, and to use sugars and salt only in moderation is given with the appropriate guidelines.

The "Food Guide Pyramid" released in 1992 presents the food guide graphically. The graphic was tested for how well it helps the general public and especially low-income groups and children to understand the food guide. A booklet tells how to choose a diet for needed nutrients and calories to maintain a healthy weight. It also tells how to choose a diet low in fat. Control of dietary fat is emphasized because a diet low in fat reduces risk for getting certain diseases and diets of most Americans are too high in fat.

Looking Back

The aim in nutritional guidance through the 20th century has been to present simple and reliable tools to help Americans choose healthful diets. Guidance has reflected well-established, research-based information on food composition, food consumption patterns, nutrition requirements and, more recently, on relationships between diet and diseases and on communication techniques.

Most Federal dietary guidance has come from USDA nutritionists. Other groups in government, especially DHHS, conducted and evaluated research that was basic to the guidance and participated in the development of the guidance itself. NRC, mainly in its issuance of the RDA and the compilation and evaluation of research on diet and health, also played an important role.

Current Federal dietary guidance flows from the Dietary Guidelines for Americans. These guidelines, reviewed every 5 years, are published jointly by USDA and DHHS based on recommendations of a committee of nongovernment authorities on nutrition and health. The Dietary Guidelines define Federal nutrition policy. Their use assures that dietary advice coming from Federal sources is sound, up to date, and consistent.

Outlook '93

For Release: Thursday, December 3, 1992

RESEARCH BASE AND DEVELOPMENT OF THE FOOD GUIDE PYRAMID

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A food guide translates recommendations on nutrient intake into recommendations on food intakes. A science-based approach to food guides began about a century ago. Food guides changed as more was learned about human nutrient requirements and the composition of foods, but the primary focus until the 1970's was on getting enough nutrients.

In 1977 the U.S. Senate Select Committee on Nutrition and Human Needs issued the "Dietary Goals for the United States," which redirected the focus of food guidance to avoiding excessive intakes of food components linked to chronic diseases. In 1980, the U. S. Department of Agriculture (USDA) and the Department of Health and Human Services (DHHS) issued the first edition of the "Dietary Guidelines for Americans." These Guidelines advise choosing a diet that is both sufficient in nutrients and without excesses. At that time, USDA began work to develop a food guide that would help people put the Guidelines into action in their daily food choices. The 1990 edition of the Dietary Guidelines includes that food guide. The new Food Guide Pyramid recently released by USDA and DHHS is an illustration of that food guide.

Research to Develop a New Food Guide

The Human Nutrition Information Service (HNIS) conducted research to develop the new food guide in the early 1980's. The development process was fully documented, including a statement of the philosophical and nutritional goals for the food guide, food composition and food consumption data bases used, and data to show that the goals and objectives specified can be reliably achieved. Nutrient data and recommendations have been slightly revised since the early 1980's based on updated data and nutritional standards.

The philosophical goals for the new food guide are summarized in table 1 and briefly discussed below.

- 1) To promote overall health. The new guide should be directed to the same audience as the Dietary Guidelines--healthy Americans, 2 years of age and older--rather than being directed to the prevention or treatment of any single disease.

- 2) Be based on up-to-date research and nutrient recommendations. Criticisms of the "Basic Four" related to its failure to assure nutrient adequacy based on newer Recommended Dietary Allowances and its failure to address current concerns about excessive intake of certain food components. The guide must also be presented in a way that is perceived as up-to-date by consumers. Research indicated that consumers regarded the familiar "Basic Four" as old fashioned, not addressing their current concerns.
- 3) Focus on the total diet. The food guide should provide guidance about all foods eaten, not just suggest a minimum amount of "protective foods" (a foundation diet). Thus the food guide would take into account the competing needs for obtaining adequate amounts of vitamins, minerals, and protein and for avoiding excessive amounts of food components that have been linked to chronic diseases. Comparisons of the current American diet with recommended intakes would focus guidance on the areas of greatest discrepancy.
- 4) Be useful to the target audience. The target audience for the food guide is consumers; therefore, the conceptual framework of the food guide must be useful to them. To be useful, food groupings should be based on the way food is used by consumers, and the way foods have been grouped in the past, as well as on nutrient content.
- 5) Meet nutritional goals in a realistic manner. Recommendations for meeting nutritional goals should be based on the usual pattern of food use by Americans to avoid having the nutrient content of infrequently consumed foods unduly influence the nutrient profile assigned to a food group.
- 6) Allow maximum flexibility. Insofar as possible, consumers should be able to eat in a way that suits their taste and lifestyle while meeting nutritional goals. For example, the guide should allow consumers to decide which foods they prefer as sources of fat and added sugars while keeping total fat and calorie intake moderate. A food guide that rigidly proscribes certain foods is not likely to be followed consistently.
- 7) Be practical. Nutrient and energy needs vary considerably by age, sex, and activity level. However, consumers often plan and prepare meals for families or other groups of people who have differing nutritional needs. To be most practical, the food guide should allow varying nutritional needs to be met by choosing different amounts of foods from the same menu.
- 8) Be evolutionary. A new food guide should build on the successful elements of previous guides and, to the extent possible, be able to accommodate the anticipated direction of future dietary recommendations without radical revision. For example, the ability to tailor more individual diets or to focus on individual nutrients might be accommodated by the formation of subgroups within the major food groups.

Once the philosophical goals were established, the research base for the food

guide took about 3 years to develop and document. The major development steps are summarized in table 2 and discussed below.

Step 1. Establish nutritional goals. The goals for energy, protein, vitamin, and mineral intake were based on the Recommended Dietary Allowances (RDA) established by the National Academy of Sciences. The goals for other food components such as fat and added sugars were based on the Dietary Guidelines for Americans and the recommendations of several other authoritative groups.

Data on the dietary and health status of the population show that intakes of protein and most vitamins and minerals generally meet recommendations. On the other hand, intakes of calcium, iron, zinc, and fiber are lower than recommended, and intakes of fat, saturated fatty acids, and sodium are higher. A quantitative goal for fiber was not established; however, efforts were made to increase intake of fiber by increasing intake of the foods that provide it --fruits, vegetables, and whole-grain products. A final nutritional goal was to help ensure adequate intakes of nutrients and food components for which RDA have not been established or for which food composition data are inadequate by recommending consumption of a variety of foods within the food groups.

Step 2. Define food groups. The nutrient content of a food was a primary consideration in the categorization of foods into groups and subgroups. Within the major food groups, subgroups were used to highlight nutrients and food components of concern. For example, within the vegetable group, special emphasis was given to dark-green leafy vegetables and dry beans and peas because they provide nutrients that are low in diets of many Americans. As in the 1979 "Hassle-Free Guide," foods that are high in fat or added sugars and low in nutrient density were separated from other foods to highlight the need to moderate intake of these foods. In addition to nutrient content, the usual use of a food in meals and how it was grouped in past food guides were also considered. The major food groups chosen for the new food guide are similar to the "Basic Four," with familiar names.

Step 3. Assign serving sizes. Four factors were considered in setting the serving sizes for the major food groups: portion sizes typically reported in surveys; easy to use, familiar units of measure; comparable content of key nutrients for the food group; and serving sizes that have traditionally been used for that food group in previous guides. No serving sizes were specified for fats, oils, and sweets because the primary message is to "use [these foods] sparingly".

Step 4. Determine nutrient profiles. These nutrient profiles represent the quantity of nutrients and other food components that one would expect to obtain on average from a serving of food from each food group and subgroup. Data from HNIS' food consumption surveys were used to determine the relative consumption of foods within each food group or subgroup. The nutrient profile of a food group or subgroup was then calculated to reflect the protein, vitamin, and mineral content of the most frequently consumed foods within that group.

To develop the nutrient profiles for the five nutrient-bearing food groups and their subgroups, only foods in their lowest fat form without added sugars were included. Therefore, the nutrient profile for the milk group reflects only skim milk; the meat group reflects only lean cuts of meat trimmed of all fat and poultry without skin; fruits and vegetables have no added fats or sugars. This approach allowed us to determine the minimum number of servings from each food group that would provide needed protein, vitamins, and minerals. It was expected that consumers would select some food items within the nutrient-bearing food groups that were higher in fat or added sugars--fried chicken, cheese, french fries--and some additional fats and added sugars from the fats, oils, and sweets group--butter, olive oil, soft drinks. The additional fat and sugars would add to the calorie, fat, and sugar content of the diet, but contribute only small amounts of vitamins and minerals (except for vitamin E). "Nutrient" profiles were also developed for fat and added sugars. The fatty acid profile assigned to the fat composite reflected the relative consumption of various types of fats by the population. For simplicity, added sugars were represented by the carbohydrate and calorie content of table sugar.

Step 5. Determine the number of servings. Determining amounts of foods to include was a two-phase process. The first part of this step was determining the numbers of servings from each nutrient-bearing food group and subgroup needed to meet the nutritional goals for protein, vitamins, and minerals. Specific Recommended Dietary Allowances (RDA) for these nutrients vary depending on age, sex, and pregnancy state. Therefore, ranges in the number of servings of the nutrient-bearing food groups were established to cover the full range of daily nutrient needs: 6 to 11 servings from the breads group; 3 to 5 servings from vegetables; 2 to 4 servings from fruits; 2 to 3 servings from the milk group; and 2 to 3 servings (5 to 7 ounces total) from the meat group.

Three sample dietary patterns, ranging from the lowest to the highest number of servings, are shown in table 3. The greater numbers of servings are for individuals with higher nutrient and calorie needs. For example, the lowest number of servings is about right for many sedentary women and some older adults; the highest number of servings is about right for teenage boys, active men, and some very active women. Three servings from the milk group is recommended to meet the higher calcium needs of women who are pregnant or breastfeeding, teenagers, and young adults to age 24. To meet the nutrient and calorie needs of preschool children, smaller servings from all food groups, with the exception of milk, are suggested.

Analyses of these dietary patterns using the nutrient profiles for each food group and subgroup showed that the specified nutritional goals of the food guide were met. Iron is the main nutrient for which adequacy remains a concern and this is only for individuals who have high iron needs (2- to 3-year-old children, menstruating, pregnant, and lactating women) and who choose diets with only the lowest numbers of servings in the food guide ranges. This problem may be addressed by selecting foods high in iron or through the use of iron supplements, if medically advised. Choosing a variety of foods from within each food group is important for attaining the nutritional goals. The

food guide was designed around the variety of foods currently consumed by most Americans. Further analysis would be required to ensure that nutrient goals are met if the food guide is adapted for subpopulations who have distinctly different eating practices.

The second part of this step of the research focused on food components for which moderation is a concern. The energy needs of individuals vary depending on several factors such as age, sex, and activity level. The average recommended energy intake for moderately active individuals over the age of 2 ranges from about 1,300 to almost 3,000 calories per day. If only foods in their lowest fat form with no added sugars were selected from the nutrient-bearing food groups and no foods from the fats, oils, and sweets group were selected, the range in the number of servings from the food guide would provide 1,220 to 1,990 calories. The difference between these minimum calorie levels and an individual's calorie needs were used to determine the amounts of fat and added sugars that could be added to the diet within various calorie limits (table 3). The amount of added fat was further constrained by the desire to keep total fat below 30 percent of total calories. Amounts of added sugars provide the balance in calories. Cholesterol levels are kept moderate by limiting egg yolks to three or four per week. Sodium levels assume no salt is added in home preparation or at the table.

Graphic Development Research

The new food guide was first presented to consumers in 1984 as part of a nutrition course developed by USDA in cooperation with the American National Red Cross. It was used in chart form in several USDA publications released in the mid-1980's. However, the perception remained among many consumers and even professionals that the "Basic Four" continued to represent current food guide information. To bring the new food guide to the attention of consumers, USDA needed to develop a publication devoted to explaining the food guide, illustrated by an appealing graphic that would convey--in a memorable way--the food guide's key messages of variety, proportionality, and moderation.

In 1988, HNIS contracted with Porter/Novelli, a market research firm, to develop and test a publication and a graphic. The publication would be devoted entirely to the food guide and the graphic would illustrate the food guide. The target audience for the publication was to be the same as for the bulletin which presents the Dietary Guidelines for Americans; that is, adults with a high school education who are not overly constrained by food cost concerns, and who have eating patterns customary of the general U.S. population.

In the first phase of the work, four focus groups of men or women 21 to 55 years of age were used to assess general familiarity with the basic concepts of the food guide. In relation to the concept of variety, "food groups" were overwhelmingly familiar. Participants demonstrated a general awareness of the concept of a well-balanced diet consisting of a variety of foods. In relation to proportionality, men reacted to the relative amounts of the food groups to consume; women were more likely to react to the specific number of servings.

Many were concerned about the amounts of food suggested, especially grain products. There was considerable interest in the concept of moderation, especially of calories and fat.

Participants were asked to comment on five different graphic presentations of the food guide. A circle graphic (the Food Wheel used by the American National Red Cross) was perceived as unimaginative, old-fashioned, or providing information they already knew. Two graphics using blocks to depict the minimum number of servings for the nutrient-bearing food groups conveyed only a limited amount of information--the ranges in the number of servings for food groups and the fats, oils, and sweets group were not shown. An inverted pyramid (funnel) design showed grains in the top, wide band and fats, oils and sweets at the bottom tip. Participants' reactions were polarized; most disliked it, finding it unsettling and off-balance. A pyramid design showed grains at the bottom and fats, oils, and sweets at the tip. Participants found this design very appealing. Grains at the base suggested "a good foundation" and the design was considered "easy to memorize."

In the second phase of the work, a draft brochure featuring the pyramid graphic was developed using text developed by HNIS staff. The brochure was tested with five focus groups of adult men or women.

As indicated in the first phase of the research, the pyramid graphic appeared to easily convey the concept of variety. Proportionality also appeared to be readily conveyed--participants felt the pyramid illustration clearly presented the relative numbers of servings suggested for each food group. They were most interested in the concept of moderation. Our goal was to communicate moderation of fat and added sugars in the total diet. This is a relatively complex message with two parts: (1) sparing use of foods traditionally thought of as sources of fat and added sugars (shown by the small tip of the pyramid) and (2) less frequent selection of foods higher in fat and added sugars within each nutrient-bearing food group (shown by the symbols). The first message might be strengthened by the use of pictures of fats, oils, and sweets in the pyramid tip; however, this would mean eliminating the symbols, which would eliminate the potential for communicating the second message. Using both pictures and symbols resulted in a cluttered design. A decision had to be made.

There was considerable debate among focus group participants about the issue of pictures versus symbols. Some participants did not understand the meaning of the symbols. Initially, participants liked the idea of food pictures in the tip, but after reading the brochure, most participants liked the concept suggested by the fat and added sugars symbols. The explanation in the brochure was considered informative and educational.

While it was clearly advantageous to be able to communicate the more complete moderation message through the use of the fat and added sugars symbols, researchers were concerned about consumers who might see the graphic without the accompanying text. Would the symbols be so distracting that the broad message of moderation might be overlooked? From the comments of several of

the participants, it appeared that those who did not understand the symbols were not distracted by them and that the explanation in the brochure provided the needed clarification.

In the third phase of the work, further testing was done to ensure that the pyramid graphic would convey the key concepts when seen without accompanying text. Sixty women 30 to 75 years of age were interviewed using a series of open-ended and rating questions. To assess the first impression created by the graphic, participants were asked to look at the graphic and comment on what it is trying to communicate. Most responded with comments related to the variety and proportionality messages (57 percent); some commented on the overall purpose of healthful eating (27 percent). When asked specifically about confusing information, virtually all of the participants (51 out of 60) said they found nothing confusing in the graphic.

The results indicated that the graphic communicated most of the intended messages even without accompanying text. While the meaning of the fat and added sugar symbols was not likely to be clear to everyone, the symbols were not distracting. However, the intent was to use the graphic only with accompanying text appropriate to the target audience.

Research on Dietary Guidance Graphic Alternatives

In spring 1991, the Department initiated additional research and testing of food guide graphic alternatives with children and low-income adults--groups who are the major beneficiaries of USDA's food assistance programs.

In July 1991, Bell Associates, Inc., was retained to develop and test graphic alternatives for conveying the key concepts of the food guide. An advisory panel of professionals from academia and a panel of USDA scientific staff provided advice to the contractor on the research study design and on development of the graphic materials.

In the first phase of the work, 26 focus groups were conducted--12 groups with a total of 84 children in grades 5, 8, or 11, and 11 groups with 67 low-income adults enrolled in either the Food Stamp Program or the Special Supplemental Food Program for Women, Infants, and Children (WIC). Blacks, whites, Hispanics, and Asian Americans were represented. Three sites were chosen for the focus groups--Boston, MA; Albuquerque, NM; and Memphis, TN. Three special focus groups were conducted with elementary and secondary school teachers of science and home economics; food industry representatives associated with various commodity groups; and representatives of several professional associations and advocacy groups. Forty-two one-on-one structured interviews were also conducted with children and with adult participants in the Food Stamp Program. The results from the focus groups and the structured interviews were very similar.

Many designs were developed and reviewed. Many were eliminated early in the process because of limited appeal. Several variations of pie charts were

tried, including a "picnic" design in which each food group was in a separate circle, resembling plates of various sizes. However, the relative proportions of the various food groups were difficult to see in the pie charts and the picnic graphic was often incorrectly interpreted as representing a single meal. The message to moderate fats, oils, and sweets, which were pictured outside the pie charts, was not understood. The teachers thought the pie chart would be an effective teaching tool; they rated it second to the pyramid. Children sometimes saw the pie charts as pizza. The food industry group rated pie charts the highest. They liked the fact that they did not "stack" food groups. However, as had been shown in earlier work, consumers perceived material in a circle format to be "old"--something they had seen before. Ultimately these designs were eliminated because of the concern that audiences would not examine them closely enough to see that they contained new information.

Several grocery cart graphics were tested because of their obvious food-related significance. A grocery cart could reasonably be interpreted as representing food for a day or a longer period. Some respondents liked the grocery cart design, but others expressed negative reactions to shopping for groceries or stated that they did not load their carts as the illustrations showed. Most children did not relate to the grocery carts. All of the grocery cart graphics were finally eliminated because they were ambiguous and somewhat controversial.

More than 10 variations on a bowl design were tested, including some with horizontal divisions and some with vertical divisions and with different arrangements of the food groups. Participants did not like the bowls with the horizontal divisions. The relative differences in the size of the sections were difficult to see, so proportionality was not conveyed well. The vertically divided bowls tested well. The bowl with a multicolored background and pictures of fats, oils, and sweets was rated highest by the low-income adult focus groups, who seemed to like the realism of the bowl shape. The food industry group liked the bowl design because it did not "stack" foods, and they liked the location of the fats, oils, and sweets at the bottom of the bowl.

Two pyramid designs were tested--one with pictures of fats, oils, and sweets in the tip and one with symbols of fats and sugars throughout. The food industry group was concerned about the hierarchical implications of being at the top of the pyramid and alternately of foods near the top being considered "bad"--guilt by association. The pyramid was rated highest by the focus groups of children and teachers and by the professional association/advocacy group. The children liked the pyramid shape with a black background and fat and added sugars symbols best. The teachers selected the pyramid with the fat and added sugars symbols with either a black or a colored background as the best teaching tool; and, indeed, the children seemed to gain the most information from these designs. The professional association/advocacy group rated the pyramid shape highest but they thought the meaning of the fat and added sugars symbols would be too difficult to understand. They recommended using the pictures of fats, oils, and sweets. The pyramid design with a black

background was the second choice of the low-income adults.

The pyramid and bowl shapes were further tested in the quantitative phase of the research. In addition, the use of fat and added sugars symbols versus pictures of fats, oils, and sweets and the use of a black versus a multicolored background were tested. A total of 3,017 individuals were interviewed at five sites--Fort Lauderdale, FL, and Boise, ID, in addition to the three focus group sites. Responses to 60 questions were used to assess the relative ability of the graphics to communicate the key concepts of variety, proportionality, and moderation and to assess the potential of the various graphics to communicate misinformation. Some of the results are shown in table 4.

Shape: The most important characteristic examined was that of shape. For the sample population as a whole, the differences between the pyramid and the bowl in communicating the proportionality and moderation concepts were large and highly significant. Higher scores for the pyramid were consistent across all of the subpopulations examined, including those for whom concern was greatest --children and individuals on food assistance programs. The recognition of the proportionality and moderation concepts in either the pyramid or the bowl increased with education, being highest for grades 8 to 10 and for adults with a high school education or more. The correlation between these concepts and education was statistically significant. Higher scores were associated with the pyramid, except for children in grades 2 and 3, who had consistently low scores for both pyramids and bowls.

The most easily conveyed concept was that of variety. This was indicated by the generally high scores for the variety concept and by the lack of correlation between the variety scores and education level. Even the children in grades 2 and 3 had high scores on this concept. The scores were slightly higher for the bowl than the pyramid for the sample population as a whole. In general, differences were not significant for the population subgroups examined.

The assessment of misinformation indicated that the pyramid communicated significantly less misinformation than the bowl. One of the most important subconcepts tested was referred to as shape inversion--believing foods at the top of the pyramid or at the sides of the bowl are "better". Concerns had been expressed earlier that the pyramid shape might give this impression. However, no significant differences were found between the pyramid and the bowl. On the other hand, some concerns were raised that the shape of the bowl might interfere with the moderation message--the base of the bowl might be viewed as more a part of the artistic representation of a bowl than as the part of the graphic intended to convey moderation of fats, oils, and sweets. The results indicated a highly significant difference between the pyramid and the bowl. More respondents failed to attribute significance to the base of the bowl and missed the moderation message. In fact, many thought the bowl graphic indicated they should eat the least from the meat and milk groups.

Symbols versus pictures: The use of fat and added sugar symbols versus

pictures of fats, oils, and sweets affected primarily the scores for the moderation and proportionality concepts. The results indicated that the use of the fat and added sugars symbols in the pyramid graphic conveyed the most information. Information about food sources of fat and added sugar was not conveyed without the symbols. When the component of the moderation message that relates only to limiting fat and added sugars in the diet was assessed, it was found that the pictures of fats, oils, and sweets were more effective than the symbols. However, for this subconcept, the pyramid shape rather than either symbols or pictures was the strongest predictor of successful communication.

Background color: The use of a black or a multicolored background did not have a significant effect on the ability of the graphics to convey information. The decision to use the fat and added sugars symbols made the black background a more desirable choice because it appeared to enhance observation of the white symbols. In addition, the black background makes the graphic easier to reproduce.

Preference and effectiveness: The final question in the interview addressed the respondent's preference for the pyramid or bowl shape. For the sample as a whole, there was a small but statistically significant preference for the bowl (49 vs. 44 percent). The pyramid was more likely to be selected as the preferred graphic by the more educated, higher income subgroups of the sample. When respondents provided the reasons for their choices, over 20 percent of those who selected the bowl said they did so because it was food related. Despite this, the pyramid remained more effective in communicating the intended graphic messages among the lower income, less-educated respondents as well as in the entire sample. Nevertheless, scores for the entire sample, especially for the 2nd- and 3rd-grade grade children, strongly suggest that the graphic must be supported by explanatory materials.

In conclusion, the graphic alternatives research indicated that the pyramid graphic with fat and added sugars symbols and a black background was the most effective of those tested in communicating the key food guide concepts of variety, proportionality, and moderation. All subgroups of the sample population, including those of different ages, education and income levels, and ethnicities responded in a similar fashion.

However, the Food Guide Pyramid will be most effective in helping people improve their food choices if it is accompanied by supporting information and materials appropriate for their age and literacy level. There is much work yet to be done to make this tool an effective part of nutrition education programs.

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Table 1. Philosophical Goals for a New Food Guide

1. Overall health
 2. Up-to-date research
 3. Total diet (needs and excesses)
 4. Useful
 5. Realistic
 6. Flexible
 7. Practical
 8. Evolutionary
-

Table 2. Steps in Building a Food Guide

1. Establish nutritional goals
 2. Define food groups
 3. Assign serving sizes
 4. Determine nutrient profiles
 5. Determine number of servings--
 - to get adequate protein, vitamins, minerals
 - to moderate fat and added sugars
-

Table 3. Food Guide Patterns at Three Calorie Levels

	Lower (1,600)	Moderate (2,200)	Higher (2,800)
Bread Group servings	6	9	11
Vegetable Group servings	3	4	5
Fruit Group servings	2	3	4
Milk Group servings	2-3	2-3	2-3
Meat Group (ounces)	5	6	7
Total Fat (grams)	53	73	93
Total Added Sugars (teaspoons)	6	12	18

**Table 4. Graphics Research--Scores¹ for Concept Communication,
Entire Sample**

N =	PYRAMID			BOWL		
	Symbols 613	Pictures 604	Total 1,217	Symbols 605	Pictures 592	Total 1,197
<u>Variety</u>						
Total ¹	86	83	85	88	85	87
<u>Proportionality</u>						
Relative proportionality	34	42	38	30	32	31
Number of servings	67	68	68	62	62	62
Daily frequency	23	24	24	30	28	29
Total ²	40	46	43	36	38	27
<u>Moderation</u>						
Limit total fat	36	42	39	26	33	30
Food sources of fat	34	9	22	32	7	19
Limit total sugar	41	41	41	33	34	33
Food sources of sugars	38	5	22	35	4	19
Total ²	36	30	33	29	24	27

Bell Associates, Inc. 1992

¹ Scores range from 0-100.

² Concept totals are weighted totals of the listed subconcept scores.

Outlook '93

For Release: Thursday, December 3, 1992

PROMOTING USE OF THE FOOD GUIDE PYRAMID
Dianne D. Odland
Nutritionist, Human Nutrition Information Service

Once the food guide graphic evaluation research was completed and the final graphic selected, the pyramid graphic and the 32-page publication that tells how to use it were ready for release. They were unveiled by the Secretary of Agriculture at a press conference in April of 1992.

If the public wasn't aware of the pyramid before its release, many surely have had the opportunity since--through the media. The Department is aware of about 5,000 magazine and newspaper articles published since last April, and that's probably just a handful of the total. Most articles have treated the pyramid quite positively--some with humor. The pyramid has even been seen beyond the U.S. border--Italy, Taiwan, and Indonesia to name a few countries featuring it. The bottom line is that the media have been very instrumental in helping acquaint consumers with the pyramid. Via the media, the pyramid has become more visible than we could ever have accomplished ourselves in a public education campaign.

And it's taken little time for the public and private sector to jump on the promotional bandwagon. A few examples:

- o General Mills has featured the pyramid on the back of its Cheerios box with a side panel devoted to serving size information relating to the pyramid.
- o Kellogg's is also planning to use the pyramid in promotional materials for their breakfast cereals.
- o Pepperidge Farm has included the pyramid on bread packaging and is reprinting the Food Guide Pyramid booklet to distribute in their nutrition education programs.
- o The Rice Council has developed new nutrition education materials featuring the pyramid.
- o The Education Department of the National Live Stock and Meat Board has produced a pyramid poster for teachers and health professionals. On the back side are two reproducible panels for making handouts. One of the panels depicts the front of the poster in black and white; the other gives additional details about serving sizes.

- o The 5-A-Day Program sponsored by the Produce for Better Health Foundation in cooperation with the National Cancer Institute has included the pyramid in some of its newsletters.
- o The 70th Anniversary issue of the trade publication Milling and Baking News, published an entire full-color issue on the Dietary Guidelines and the Food Guide Pyramid, its development, and its promotion.
- o The Metropolitan Life Foundation has published a booklet built around the pyramid, "How to Steer Your Family to Healthy Eating." The booklet is part of Met Life's nutritional campaign on "Nutrition and the Family" associated with its ongoing public health education programs.
- o Campbell's Soup Company has included the pyramid in a guide to help teachers integrate the Dietary Guidelines into school curricula.
- o The American Medical Association (AMA) will be replacing the "Four Food Groups" with the pyramid in the next textbook editions that they print.
- o In a cooperative effort with the Society for Nutrition Education, McDonald's corporation is including the pyramid in a series of public service announcements aired on Saturday mornings on CBS TV. They have also developed a nutrition brochure and a teachers' guide that accompanies a 20-minute video.

How is USDA Promoting the Pyramid?

We work closely with our sister agency, the Food and Nutrition Service, and in a few minutes Jan Lilja will tell you about their pyramid promotion activities. I'll concentrate on how the Human Nutrition Information Service is promoting it. First, of course, is The Food Guide Pyramid publication. Single copies are available for \$1.00 each from the Consumer Information Center in Pueblo, Colorado. Bulk copies are available for \$65 per 100-copy lot from the Government Printing Office. The publication will soon be available in black-and-white reproducible form and also in Spanish.

In June 1992, HNIS cooperated with the Food Marketing Institute (FMI) in producing a condensed version of the pyramid publication--an eight-panel colored brochure and a black-and-white reproducible master. These materials were released in mid-July at the Society of Nutrition Education meeting here in Washington, D.C. These are similar to the condensed version of the Dietary Guidelines developed with FMI in 1991. We've now revised the condensed guidelines to incorporate the pyramid and will soon have the revised version available in Spanish. The HNIS is making information copies of these materials available to nutrition professionals; FMI, as you'll hear in a few minutes, is distributing them to their member supermarkets, which have initiated some very exciting projects.

Recognizing the need for a simple multipurpose reproducible, HNIS developed a two-sided leaflet showing the pyramid on front and basic information about its

use on back. We've also developed a colorful 21-by 28-inch poster featuring the pyramid and are planning a Spanish version. Again, information copies are being made available to professionals.

The Human Nutrition Information Service has incorporated the pyramid into several Dietary-Guidelines-oriented publications now ready for press--a Dietary Guidelines teaching kit for health educators to use in junior and senior high school classes; a series of booklets designed for older Americans; a booklet targeted to functionally literate adults at the 5th or 6th grade reading level; and a major revision of a set of bulletins that show the general consumer how to put the Dietary Guidelines into action. All of these publications will be promoted through professionals working with these audiences.

We are also trying to step up promotional efforts by loaning out both four color negatives and computer disks for the pyramid publication and the poster. These are available to health professionals, educators, textbook publishers, professional and trade associations, and the food retail and food service industries for use in classrooms, grocery stores, WIC clinics, Food Stamp offices, worksite wellness programs, and media productions.

We're very interested in participating in cooperative efforts to promote the pyramid. During the past few months we've cooperated with USA Weekend in doing food and nutrition makeovers for five families across the country. We conducted in-depth telephone interviews with these families to learn about their eating and shopping habits and their major nutritional problems; conducted a computerized dietary analysis for each family member; developed healthful versions of their favorite family recipes; and, finally, we traveled to each home to bring personalized makeovers to the families. The pyramid was emphasized in each of these makeovers and USA Weekend's article on the makeovers (which appeared November 13) featured the pyramid as a clip-out reminder of what healthy eating is all about. Through these five families, we were able to reach millions.

This fall, several USDA agencies participated in a National satellite video teleconference sponsored by the Extension Service on "Using the Food Guide Pyramid in Nutrition Education." The video discusses the pyramid, its research base, and nutrition education programming. Copies of the video are available for loan from the Cooperative Extension System. Cooperative Extension, I know, has been using the pyramid across the country in many of their programs.

Upcoming plans for pyramid promotion--

- o Publishing an article on the history of food guides and the basic research that supports development of the Food Guide Pyramid in this month's issue of Nutrition Today.
- o Preparing slides on the history and development of the food guide for use by nutrition and health professionals.
- o Developing a narrated slide presentation on the Food Guide Pyramid for use by extension agents, teachers, worksite wellness directors, and others who work with consumers.

- o Developing a Food Guide Pyramid poster for elementary school children that has lesson plans on the back.
- o Working with nutrition, health, and home economics textbook publishers to incorporate the pyramid.
- o Cooperating with the Food and Nutrition Information Center of the National Agricultural Library in establishing a Food Guide Pyramid information exchange.
- o Cooperating with COSSMHO (the National Coalition of Hispanic Health and Human Services Organizations) in development of an educational video and brochure in Spanish which will include information on the pyramid.

We are also interested in making the pyramid available for physicians to use in nutrition counseling, newsletters, and office distribution and in worksite wellness programs in government, educational institutions, and the corporate world. Overall, our goal is to make the Food Guide Pyramid an effective and popular educational tool nationwide. We expect it to be used for many years in food guidance materials and programs and we are anxious to cooperate with others--in both the public and private sectors--in promoting it.

Outlook '93

For Release: Thursday, December 3, 1992

PROMOTING USE OF THE FOOD GUIDE PYRAMID:
The Retail Food Industry Perspective

Susan T. Borra, R.D.
Director, Consumer Affairs, Food Marketing Institute

The retail food industry has a long history of interest and commitment to the nutritional well-being of our nation's consumers. This morning I would like to share the evidence of this commitment by highlighting the policies and programs that supermarkets have implemented in relation to dietary guidance and the use of The Food Guide Pyramid.

The Food Marketing Institute (FMI) is a nonprofit association conducting programs in research, education, industry relations and public affairs on behalf of our 1,500 members — food retailers and wholesalers and their customers in the United States and around the world. FMI's domestic member companies operate approximately 19,000 retail food stores with a combined annual sales volume of \$190 billion — more than half of all grocery store sales in the United States. FMI's retail membership is composed of large multi-store chains, small regional firms and independent supermarkets. Its international membership includes 250 members from 60 countries.

This May, the FMI Board of Directors formalized its commitment to nutrition by adopting *The Food Marketing Institute Nutrition Policy and Strategies* for the retail food industry. The objective of developing this document was to identify and prioritize issues related to nutrition and the retail food industry and to develop strategies to address these issues.

The FMI Nutrition Policy statement is as follows:

"As the purchasing agent for the consumer, food retailers are committed to providing customers with the opportunity and information to select foods that make up a nutritious diet. It is important to foster the consumer awareness of the relationship among food, diet and health based on the *Dietary Guidelines for Americans* and thereby promote the public health."

Education information and marketing. So how are supermarkets using the Food Guide Pyramid to provide consumer information and how are they beginning to use it in nutrition marketing strategies?

Many retailers have reproduced the brochure, *The Food Guide Pyramid. . . Beyond the Basic Four*, from the camera-ready slick. This is the value of developing an eight-panel easy-to-reproduce brochure. These are samples of brochures produced by P & C Foods with 64 stores based out of Syracuse, New York; Dorothy Lane Markets with 2 stores in Dayton, Ohio; The Copps Corporation with 16 stores based in Stevens Point, Wisconsin; and, Price Chopper Supermarkets with 77 Stores based out of Schenectady, New York.

We left space on the back of the brochure for the distributing company to print their name, logo, address, phone number, or other information. The sample shown here is from Price Chopper Supermarkets.

Many of the retailers have incorporated the Pyramid into other information they produce for their customers. Here is the Pyramid published in D'Agostino's Consumer Newsletter along with an informative article. D'Agostino Supermarkets operates 25 stores in the New York city area.

Here is the Pyramid published in a new nutrition booklet from The Stop & Shop Companies, which has 117 stores in the Boston area. "Leaner Choice Guide to Low Fat Shopping" is a program that helps customers identify lower fat foods in the supermarket. They are also using the pyramid shape as part of the logo to identify their nutrition program.

Quillens, Inc. with 6 stores in La Crosse, Wisconsin has included the Pyramid on recipe cards they have produced for in-store distribution.

Retailers are also promoting the Pyramid to children. Here is a newsletter from Washington, D.C.-based Giant Food's "Healthy Start" nutrition information program for young children. This newsletter, which was distributed in all of their 155 stores, explains the Pyramid to parents and includes an activity for children to make a Food Pyramid Poster.

While these and other examples of providing shoppers with this information are indeed beneficial to consumers, I think we can make great strides by using the "Pyramid Principles" in nutrition marketing strategies.

The "5-A-Day for Better Health" produce promotion campaign is an excellent example of implementation of the nutrition principles embodied in the Pyramid. This simple message -- eat 5 fruits and vegetables a day -- is a win-win nutrition marketing strategy with the consumer, the retail food industry, and the produce industry as the winners!

Here is how Pratt Foods, an eight store operation near Oklahoma City, used the Food Pyramid as a nutrition marketing tool for produce. J.B. Pratt, the company president, developed this large three-dimensional Food Guide Pyramid model for display in his produce departments. Actually, J.B. is personally quite committed to nutrition marketing as is evident on his Oklahoma vanity license plate -- "5 A DAY."

We are also starting to see the Pyramid being used for nutrition marketing of the Bread, Cereal, Rice and Pasta Group. Here are some private label bread products from Wegmans Food Markets with 45 stores based in Rochester, New York. They have included the Pyramid on their packaging along with simple answers to the questions, "What is the Food Guide Pyramid?" and "What is a Serving from the Bread Group?"

These are just a few examples of the ways that retailers are using the Food Guide Pyramid.

I hope you can see that retailers are committed to providing the opportunity and information for consumers to select foods to make up a healthful diet. We look forward to working on continued opportunities for the retail food industry to promote healthy eating based on the Food Guide Pyramid and the Dietary Guidelines for Americans.

Outlook '93

For Release: Wednesday, December 2, 1992

Yvonne Bronner, RD (registered dietitian)
Spokesperson/American Dietetic Association

Thank you. I am pleased to be here today on behalf of the nation's largest group of food and nutrition professionals to discuss the importance of the new Food Guide Pyramid in our consumer education efforts.

As health and nutrition have become top priorities for many Americans, the key role dietitians play in providing consumers with accurate nutrition information has gained much attention.

With this attention has come increased opportunities and challenges... challenges that each and every one of our 62,000 members faces on a daily basis. While people have become more knowledgeable about the affect good nutrition can have on their health, the information they have and their assumptions of what that information means are often incorrect.

For years registered dietitians and other nutrition experts have advised the public to follow the principles represented by the Food Guide Pyramid. But, with the introduction of the Pyramid, we now have a powerful image to illustrate our principles and support our educational efforts.

The Pyramid helps us show that all food groups are important to the total diet, because each provides nutrients essential for good health....a concept we have promoted for years. This very important point also underscores a philosophy long held by The American Dietetic Association.....that there are no good or bad foods.

Central to our education effort is the overall mission of The American Dietetic Association.... to serve the public by promoting optimal health, nutrition and well-being.

Now, as all of us charged with this mission know, we are just beginning to reach the point where our message is being received and understood....thanks in part to the public's demand for accurate nutrition information.

Yet, promoting healthy eating habits takes time and effort. We need to cut through the maze of confusion and help consumers separate nutrition fact from fiction. This effort is more easily accomplished when we have the right tools to work with.

That's where the Food Guide Pyramid comes in.

As an educational tool, the Pyramid should allow us to build a greater understanding of how to eat healthfully and to close the gap between the perceptions and realities of a good diet.

Obviously, our expectations are high. Since much of our philosophy is built into the Pyramid, we believe it can help us achieve many of our goals. That's why we are incorporating the messages of the Pyramid in many of our public education initiatives.

The most visible of these efforts is National Nutrition Month.

National Nutrition Month is a nutrition education and information campaign sponsored every March by The American Dietetic Association's National Center for Nutrition and Dietetics.

By way of background, the National Center for Nutrition and Dietetics was established in 1990 to provide objective information about food and nutrition to the public, media, industry and health care professionals. The Center's major consumer programs include a national toll-free consumer hot line, Project LEAN...which stands for Lowfat Eating for America Now, and, of course, National Nutrition Month.

Begun in 1973, the campaign offers the public basic nutrition knowledge and practical tips needed to make informed food choices and develop sound lifelong eating habits. The multi-year theme for National Nutrition Month is Eat Right America....a call to action that challenges Americans to take charge of their nutrition practices.

In 1993, the focus of the Eat Right America campaign is the USDA's new Food Guide Pyramid.

We have called on decision makers in food service and corporate America, among others, to play an important role in our campaign to help people understand what it means to eat right.

To those individuals, companies, institutions, associations and agencies who join us in March to promote the campaign and use the Food Guide Pyramid, we are offering promotional guidance and numerous marketing materials.....all contributing to a powerful and unified program to reach the American public all across the country.

Our campaign materials are designed to provide consumers with practical information on how to use the Pyramid to make food choices consistent with healthy eating. There are posters, table tents, cafeteria tray mats, bookmarks, snack packs and other colorful items showing the Pyramid.

In addition, we are encouraging our partners to stress that the Food Guide Pyramid will help people eat right because it provides guidelines for a healthful diet that incorporates the concepts of balance, variety and moderation... and because it offers practical guidelines to help individuals obtain the right amounts of nutrients and calories needed to maintain a healthy weight and to reduce the risk of certain diseases.

The American Dietetic Association has already begun publicizing the 1993 campaign.....press kits are being sent to national consumer magazines, newspapers, radio and television stations. We are producing a video news release for the campaign that will be distributed by satellite for use during National Nutrition Month. Our national and state network of nearly 100 spokespersons, all RDs, will be pursuing interviews with local and national media and will be assisting dietetic associations nationwide with their publicity efforts.

One of the most important elements of the upcoming campaign...and one of great benefit to consumers....is the special message about the Pyramid that will be featured in March on our national consumer nutrition hot line. The toll-free hot line is operated by our National Center for Nutrition and Dietetics and staffed by registered dietitians. The popularity of the hot line is further evidence of the public's interest in accurate nutrition information. In the 10 months of operation, more than 220,000 callers requested information on diet and nutrition.

Another highly visible component of Eat Right America in 1993 will be the special teachers kit -- Pyramid Power -- that will be featured in the January issue of Learning Magazine.

This will be a very useful tool for elementary school teachers who want to show students how the principles of the Food Guide Pyramid affect their nutritional well-being. The kit will focus on several activities for children, including a memory game and a Rap song about food groups listed in the Pyramid.

As you can tell, The American Dietetic Association has identified numerous tactics to ensure that messages about the Food Guide Pyramid's

approach to healthy eating reach the public and that the public has the information, skills and motivation to rebuild their eating attitudes and habits from the ground up.

The Food Guide Pyramid is a strong and, hopefully, enduring image, as well as a valuable tool. If its messages are properly translated into practical food choices for consumers, it should allow us to reach our goals and make a positive impact on the public's health. We hope other organizations are as excited as we are about using the Pyramid in public education efforts. I appreciate the opportunity to share our efforts with all of you. Thank you.

Outlook '93

For Release: Thursday, December 3, 1992

AMERICA'S CHANGING EATING HABITS

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Introduction

Good Morning! I appreciate the opportunity to talk with you this morning about Changing Eating Habits in the United States. Conference organizers stressed two points when they invited me to speak here--keeping my presentation short and emphasizing the link between changes in eating habits and nutrition education.

With that mandate in mind, let me start by spelling out the key points that I plan to emphasize today.

- First, we know with increased certainty that diet and health are closely linked. While we continue to learn more about this link, we know enough to be able to identify the basic components of a "healthy diet" and to develop dietary guidelines.
- Second, we can use commodity disappearance data to gauge in broad terms how our eating patterns compare with these dietary guidelines and how they are changing over time. Disappearance data calculated using commodity supply and population estimates for the last two decades suggest that eating habits are shifting toward healthier diets--although slowly and unevenly.
- Third, survey data on food use and intake suggest that eating habits vary widely among individuals and that there is considerably more potential to improve diets in some groups (such as low-income households and households with infants and children) than the national disappearance averages imply. The data also suggest that there is even greater potential for improving the diets of individuals in these groups with special needs (such as infants and pregnant and lactating teens).
- Fourth, nutrition education programs can accelerate the shift toward healthier diets. USDA's 1992 review of its nutrition education programs emphasized the need to strengthen integration of the Department's many different nutrition research, monitoring, education, and evaluation activities and to combine public

and private efforts to maximize program impact. However, this review also recognized that more than "awareness" of the diet-health link is needed to change behavior and that many different socio-economic factors reinforce existing eating habits and make changing behavior a slow, difficult process.

Let me make each of these four points in greater detail.

Point 1. What Do We Know About Diet and Health?

Increasingly conclusive physical and social science research done in both the public and private sectors shows that diet and health are closely linked. Examples include the link between excessive fat intake and coronary heart disease; excessive sodium intake and high blood pressure and strokes; and inadequate fiber intake and certain types of cancer. The Surgeon General's 1988 Report on Nutrition and Health drew on this research to conclude that: "For the two out of three adult Americans who do not smoke and do not drink excessively, one personal choice seems to influence long-term health prospects more than any other-- what you eat."

This knowledge about the link between diet and health has been widely disseminated. Public education efforts date back to the mid-1950's with the American Heart Association's efforts to publicize the relationship between fats, cholesterol, and heart disease. FDA's Health and Diet Surveys found that by the mid-1980's 75% of the people questioned were "aware" of this link in at least general terms. And perhaps the least scientific but most convincing indications of this increased awareness is the explosion of "light" and "healthy" products in food markets.

While more research is needed, enough is known to identify the key components of healthy diets--diets that reduce risk of chronic disease. We know healthy diets tend to:

- be low in fat, saturated fat, and cholesterol;
- include plenty of vegetables, fruits, and grain products; and
- use sugar and salt sparingly and include a variety of different foods each day from the 5 different major food groups.

We also know that there are many food patterns and food combinations that can provide a healthy diet. Patterns may vary because of individual preferences, differences in ethnic and cultural cuisines, and seasonal factors. But in the right balance, virtually all foods can be "healthy."

USDA's Food Guide Pyramid translates these general characteristics into the specific dietary guidelines summarized in Chart 1.

Chart 1. USDA Dietary Guidelines: A Daily Food Guide

Food Group	Suggested Servings Per Day
Breads, cereals, rice & pasta	6-11 servings
Vegetables	3-5 servings
Fruits	2-4 servings
Milk, yogurt, and cheese	2-3 servings
Meat, poultry, fish, dry beans, eggs, and nuts	2-3 servings
Fats and oils	Use sparingly
Sweets Group	Use sparingly

Source: USDA The Food Guide Pyramid

Point 2. How Do American Diets Stack Up?

How do American eating habits compare with these dietary guidelines?

There is no one source of information on what Americans eat, how eating patterns are changing over time, how patterns vary between individuals and across groups, and how they compare with dietary guidelines. However, data from the sources outlined in Chart 2 can be used to develop broad indicators.

Chart 3 draws on data from USDA's Food Consumption, Prices and Expenditures data base to gauge changes in eating habits over the 1970s' and 1980's. The data measure per capita disappearance by simply dividing the total supply of a particular commodity available for human use (i.e... production adjusted for stocks, trade, and domestic non-food use) by population estimates. Hence, while the data do not measure actual intake, they do reflect the general level of consumption and changes over time.

One other important caveat--the disappearance data do not reflect changes in product characteristics over time. Many foods were "redesigned" over the 1970's and 1980's. Examples include efforts to lower fat content in meats and to change the mix of saturated and unsaturated fats and oils. These redesigns tend to move eating patterns toward healthier diets and can get lost in Chart 3's broad categories.

With these caveats in mind, what do the per capita disappearance measures show?
American eating habits are changing. Americans are including more flour and cereal in their diets in a variety of different forms. Disappearance rose from 135 pounds per capita in 1970 to 185 in 1990 but is still more than 100 pounds below the 300 pounds

Chart 2. Food Information Sources

- USDA's Food Consumption, Prices, and Expenditures (ERS, annual)
 - USDA's Continuing Survey of Food Intake by Individuals (HNIS, 1985-86, 1989-91, 1994-96)
 - USDA's Nationwide Food Consumption Survey (HNIS, decennial, latest 1987-88)
 - BLS's Continuing Consumer Expenditure Survey (annual)
 - DHHS's National Health and Nutrition Examination Survey (1971-74, 1976-80, 1988-94)
-

reported for 1910 when bread played a more important role in the diet.

While incomplete because of USDA's focus on the major products only, the vegetable data show strong growth in per capita disappearance, changes in the mix of vegetables eaten, and changes in the form they are eaten. Moreover, as with cereals, increases appear to have been heavily concentrated in the second half of the 1980's after many years of little or no growth. With roughly 85% of the vegetable total included, disappearance rose more than 35 pounds per capita and use shifted heavily toward more fresh and frozen and away from canned.

The fruit data, drawn from USDA's information on roughly nine-tenths of the total, shows the same general pattern. Disappearance was up sharply. Juice consumption rose rapidly in the 1970's, but consumption of fresh, frozen, and dried fruit increased more rapidly in the 1980's as consumption shifted away from canned products.

The dairy data reflects several different trends. Disappearance of all dairy products was 564 pounds per capita in 1970 on a milk equivalent/milkfat basis, 543 pounds in 1980, but 571 pounds in 1990. In the beverage market, use of plain whole milk declined (from 203 pounds to 86 pounds) but the low fat and skim milk component rose (from 42 pounds to 121 pounds). Several other trends were also at work. Disappearance of cheese and cream products rose sharply, with cheese up from 11 pounds to 25 pounds and cream products up from 5 pounds to over 7 pounds.

In the meat, poultry, and fish category, several different trends were also at work. Disappearance on a boneless, trimmed weight basis was up--from 177 pounds in 1970 to 183 pounds in 1990. However, red meats fell from 132 to 112 pounds while poultry and fish

Chart 3. Food Disappearance Indicators

Food Group	Per Capita Disappearance		
	1970	1980	1990
	-----pounds per year-----		
Flour & Cereals	135	146	185
Vegetable	322	319	359
Fruit ^{1/}	224	251	259
All dairy ^{2/}	564	543	571
Plain beverage milk	244	219	207
Skim milk and 1%	14	26	42
2%	28	55	79
Whole	203	138	86
Cheese	11	18	25
Meats Group ^{3/}			
Meat, poultry, & fish	177	179	183
Red Meats	132	126	112
Poultry, fish	46	53	71
Eggs	39	34	30
Nuts	7	7	9
Sweeteners	128	132	161
Caloric ^{4/}	123	124	139
Refined sugar	102	84	65
Corn sweeteners	19	39	73
High intensity (low calorie) ^{5/}	6	8	22

Source: USDA/ERS Food Consumption, Prices, and Expenditures, 1970-1990.

^{1/} Farm weight.

^{2/} Total shown on a milk equivalent, milkfat basis. Items shown separately are on a product weight basis.

^{3/} Boneless, trimmed weight.

^{4/} Dry weight.

^{5/} Sugar sweetness equivalent.

disappearance rose from 46 to 71 pounds. In the fats and oils group, disappearance is also up. However, the animal fat component (products such as lard) is down while the vegetable component is up and unsaturated products have gained compared to saturated.

In the caloric sweeteners category, per capita disappearance is also up from 128 to 161 pounds from 1970 to 1990 due to rising consumption of items such as soft drinks and sweetened desserts. However, changes in composition have been even more pronounced than the change in total disappearance. Low calorie sweeteners and corn sweeteners have risen several times faster than the sweeteners total while disappearance of refined sugar is down sharply.

What do these commodity disappearance data suggest regarding America's move toward healthier diets?

While strict comparisons with the dietary guidelines are not possible, the disappearance data point to several major improvements and areas where further shifts are needed (Chart 4). American diets still tend to include too high a proportion of total calories from fat (more than 30%); too high a proportion of calories from saturated fat sources (more than 10%); and too much cholesterol, and too little fiber and selected vitamins and minerals.

Several trends are noteworthy among the individual food groups. Meat disappearance has been shifting toward poultry and fish and milk disappearance has been shifting toward low fat and skim products. Many meat and dairy products have also been "redesigned" with an eye toward lowering fat, shifting to unsaturated fats, and lowering sodium and sugar content. For example, with industry emphasis on delivering a "healthier" product, genetic improvements in livestock have cut fat. Intermuscular fat in hogs has fallen from 14% of carcass weight in 1970 to 5% in 1990. Closer trimming of pork and beef has reduced the fat delivered to the consumer even further. Changes have been less marked but have also been significant in the poultry sector.

Looking at the cereals, vegetables, and fruits categories, disappearance is increasing but is still well below the "five-a-day" recommendation. This leads to concern about getting enough fiber as well as critical vitamins and minerals. However, industry efforts to develop more whole grain products and raise fiber content in new and traditional products is a positive trend not fully reflected in the disappearance numbers. Moreover, the shift toward more fresh and frozen vegetables and fruits is encouraging in that it tends to reduce sugar and salt intake.

Looking at sweeteners, disappearance data converted to nutrient equivalents suggest that Americans are still getting a significant share of their calories from sugar and syrups that have minimal vitamin, mineral, and fiber content. This is not a problem in and of itself--so long as total calorie intake and food choices are balanced and individuals with special needs adjust intake accordingly.

It is important to note in discussing these commodity changes that very few foods are "good" or "bad" in and of themselves despite wide use of these oversimplified labels.

Chart 4. Food Disappearance Trends and Dietary Guidelines

Food Group	1970-90 Disappearance trend	Consistent with Dietary Guidelines
Cereals	+	+
Vegetables	+	+
Fruit	+	+
Dairy	+	+/-
Fat		+
Calcium		+
Meat	+	+/-
Red Meat	-	+/-
Fat		+
Vitamins and Minerals		-
Eggs	-	+/-
Protein		-
Cholesterol		+
Visible fats and Oils	+	-
Added Sweeteners	+	-

Note: Pluses and minuses indicate the direction of the 1970-90 disappearance trend and whether or not it is consistent with the dietary guidelines.

Source: Charts 1 and 3.

Virtually all foods have something to contribute to a healthy diet. The balance of foods eaten is critical in determining how healthy a diet is. For example, if an individual eats less fatty meat and whole milk to lower fat intake, adjustments may be necessary elsewhere in their diet to find alternative sources for critical vitamins, minerals, calcium, and amino acids.

Abstracting from the commodity detail, it is clear that disappearance data seem to show that we are moving toward healthier eating patterns. Moreover, the pace of change

appears to have quickened in the 1980's, particularly during the second half of the decade. But several serious intake problems persist and conflicting trends in some products are working to slow the shift.

Point 3. How Typical is the Average American Diet?

How Typical is the Average American Diet?

Anecdotal evidence and USDA research suggest that eating habits vary widely enough to limit the usefulness of national disappearance averages. Although it has its own limitations, survey data from USDA's Continuing Survey of Food Intake by Individuals and Nationwide Food Consumption Survey allows us to develop cross-sectional snapshots and to relate food intake behavior to socio-economic factors.

This survey information shows that large, readily identifiable groups consumed significantly more fat, saturated fat, and cholesterol; less fiber; and more sodium and sweeteners than the national average suggests. Looking at household data to identify key group characteristics, ERS's Steve Lutz found income, household size and type, and race to be significant explanatory variables. Further research by Frazao and Putler also identified age, sex, and education as important attributes.

Chart 5. Higher Risk Groups: Selected Food Use Comparisons
Pounds per 21-meal equivalent person: 1987/88

Food Group	National Average	Low Income	Black	Single Mother
Cereals	154	159	146	152
Fresh vegetables	175	156	157	139
Fresh fruit	147	107	111	99
Dairy	439	392	272	395
Meat				
Red Meat	143	150	182	150
Poultry	64	62	91	63
Eggs	26	29	26	26
Vegetable and fruit juices	112	95	111	97
Sugars and sweets	41	47	49	45

Source: USDA/ERS

Chart 5 looks at selected intake indicators for low income households, households with single mothers, and black households to gauge how different intake patterns were. Red meat intake proved to be more than 25% higher than the national average in black households and 5% higher in low income households and households with single mothers. Conversely, fruit and vegetable intake proved to be almost 20% lower in low income households, over 15% lower in black households, and over 25% lower in households with single mothers.

Given what we know about the link between diet and health, these intake measures indicate that the groups in question are at greater risk of chronic, diet-related diseases than the population as a whole. Moreover, while the survey data is not conclusive, individuals with special dietary needs within these groups--such as infants and pregnant and lactating women--appear to be at even greater risk. Data from the Center on Disease Control showing higher incidence of obesity, hypertension, coronary heart disease, certain types of cancer, and low birth weights among these problem groups serves to reinforce this conclusion.

Point 4. How Do We Accelerate the Move Toward Healthier Diets?

Given what we know about the diet-health link and eating habits, do we intervene to promote healthier diets? If so, how?

The decision to intervene can be weighed on strictly economic grounds. With medical costs rising sharply, the savings from reducing diet-related disease should be quite large. Moreover, productivity gains from a healthier population living longer should add sizeable benefits to these cost savings. Hence, the pay off should be large--if we can identify a reasonably-priced intervention strategy that actually works to change eating habits. The magnitude of the problem, the limited funds Federal and state governments have to invest, and the vehicles available in the food marketing system suggest a mix of public and private efforts.

In the public area, emphasis has been put on nutrition education programs aimed at both the general population (ie..Dietary Guidelines) and target groups (ie..EFNEP). But despite considerable program success in rising general awareness of the diet-health link, disappearance and intake data suggest that changes in eating habits have been limited. This has led to the recognition that more than "awareness" is needed to change behavior and has sparked concern about the design and execution of USDA's programs.

USDA's 1992 Nutrition Education Initiative reflects these concerns. It emphasizes behavior change as the ultimate goal of the Department's many different nutrition research, monitoring, outreach, and evaluation activities. It also calls for added monitoring to better identify needs, better coordination of outreach activities across the four major program agencies, and more evaluation to gauge program effectiveness.

Underlying this assessment, however, is growing awareness that changing eating habits is a difficult task requiring sustained, often costly efforts.

Public involvement is not limited to nutrition education. USDA is involved at some point in the production and/or marketing of virtually all the major foodstuffs eaten by American consumers. Greater consistency across USDA's farm, food, and nutrition programs could accelerate the shift toward healthier diets. Changing USDA guidelines for purchasing and distributing products for the food programs, for example, could help promote healthier diets. Given the dollars involved in the farm and food programs compared to nutrition education and the potential for shaping producer decisions and consumer eating patterns, more program integration is critical.

Efforts in the private sector have and will continue to be critical. New products have been developed and existing products tailored to enhance their nutritional appeal. In many cases, this related to the food marketing system responding to changing consumer demands and positioning itself to take advantage of new sales opportunities. The marketing of pork as the "other white meat" is a good example. However, industry has also worked in many cases to "lead" consumer demand. Nutrition labels were in use in much of the industry well ahead of federal and state regulations.

The potential for further progress here is significant. The advertising campaigns use to sell improved products and related activities such as nutrition labeling reach virtually the entire population and appear to be quite effective. Hence, encouraging public-private partnerships--such as the dissemination of the Food Guide information on the back of breakfast cereal boxes--has to be a part of an effective nutrition education program.

Conclusions

Are Americans changing their eating habits? What are the prospects for accelerating the move toward healthier diets?

Food disappearance, use, and intake data for the 1970's and 1980's suggest that American eating patterns are shifting--albeit slowly--toward healthier diets. However, this same data suggest that there is still considerable room for improvement, particularly in target groups such as low income households.

Experience over the last 2 decades also suggests that more than general "awareness" of the link between diet and health is needed to improve eating habits. Changing human behavior in an area as basic as food consumption is difficult. Food choices are shaped by many socio-economic factors as well as food prices and habits. Shifting eating patterns often "goes against the grain" as income, age, race, household characteristics, and education work to reinforce existing food consumption patterns. This recognition is helping to forge more effective USDA nutrition education programs and stronger links

between public and private efforts. Both are needed if we are to accelerate the move toward healthier diets in the 1990's.

Outlook '93

For Release: Thursday, December 3, 1992

WIC/EFNEP: A PARTNERSHIP THAT WORKS

Valerie A. Long
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University of New Hampshire Cooperative Extension

Critical to our effectiveness as nutrition educators, is our ability to work together in a collaborative fashion as part of a nutrition coalition. In fact, not only our effectiveness, but our survival depends on whether or not we can all work together toward the same goals.

Individually we can function, but together we provide comprehensive programming for clientele, with the most impact. And impact is really what we're talking about. Positive collaborative working relationships with fellow agencies and organizations share resources, share ideas and share a commitment to serve their audiences. Professionals gain a greater understanding of each other's agencies, learn how to break down barriers, stimulate progressive thinking and become innovative.

In New Hampshire, WIC and EFNEP have a partnership that works. Both agencies clearly understand the benefits of collaboration and have worked hard to complement each other's services. And our partnership is a natural! Let's take a minute to review the goals of WIC and EFNEP to better understand why:

The Special Supplemental Food Program for Women, Infants, and Children

Recognizing the needs of many poor women and children for assistance to purchase nutrient-dense foods, federal maternal and child health nutrition consultants advocated for a program of targeted supplemental food assistance. This effort culminated in the amendment to the Child Nutrition Act in 1972, establishing the Special Supplemental Food Program for Women, Infants, and Children (WIC) as a two-year pilot program. WIC programs began to serve clients in 1974. Administered at the federal level by the Food and Nutrition Service of the USDA, WIC distributes cash grants to state health agencies and Indian agencies (recognized by the Bureau of Indian Affairs) which in turn allocate funds to city or county health departments or to other local nonprofit agencies in their jurisdictions.

As an adjunct to health care, the WIC program provides food to participating pregnant, postpartum, and lactating women and to infants and children up to their fifth birthday. It funds the purchase of supplemental foods and the administrative costs incurred by health

agencies in conducting nutrition education and carrying out other program services. Federal WIC regulations require that income and nutritional-risk eligibility criteria be used to certify program participants. State and local WIC agencies establish family income guidelines between 100 and 185 percent of the federal poverty guidelines, usually consistent with the guidelines they use for other reduced-price health and food service programs.

While nutritional-risk criteria are established by each state agency, the federal regulations recommend the following indicators of poor nutritional status:

- detrimental or abnormal nutritional conditions detectable by anthropometric or biochemical measurements
- documented nutrition-related medical conditions
- dietary deficiencies that impair or endanger health
- conditions that predispose persons to inadequate nutritional patterns or nutritionally related medical conditions.

Professionals in the health agencies certify clients using the risk criteria and prescribe the appropriate food package. The WIC food package is limited to USDA-authorized foods that are rich in protein, iron, calcium, and vitamins A and C. The WIC packages are intended to supplement the foods that participants would ordinarily purchase or receive through other food assistance programs. While a few agencies distribute foods directly to clients, most issue vouchers or checks redeemable for the WIC food package at participating retail food stores.

Two nutrition education contacts within each six-month certification period are mandated for WIC participants. The purpose of the education contacts is to guide participants to use the WIC food package to the best advantage and to reduce nutrition-related health problems. The nutritionist designs, develops, and conducts or supervises the nutrition education activities.

The Expanded Food and Nutrition Education Program

The Expanded Food and Nutrition Education Program (EFNEP) was created after a comprehensive USDA nutrition study done in 1965. This study showed that the diets of low income Americans were very low in nutrients such as calcium and iron, and eating habits in general were poor.

As a result of successful pilot programs conducted around the country by Cooperative Extension in 1968, Congress made dollars available to Cooperative Extension for a national nutrition education program for low-income people. In New Hampshire, EFNEP began on a statewide basis in 1969.

The goal of EFNEP is to improve the health and nutritional status of families and

individuals. EFNEP works to achieve lasting improvements for families while promoting immediate changes in food habits.

EFNEP is administered jointly by the federal, state, and county Cooperative Extension. Families and individuals are taught in a one-to-one home visit, small group learning experience, or other innovative learning methods by paraprofessional nutrition aides.

EFNEP Program Associates teach both adults and youth:

- the essentials of good nutrition
- proper food storage, safety, and preparation
- planning and preparing low-cost meals
- budgeting and managing available resources, including food stamps
- growing and preserving foods at home

EFNEP's strength continues to be the high quality nutrition education it provides to families and youth at risk. Legislators continue to say they fund EFNEP because of the quality of education provided through the Cooperative Extension System.

The key factor to our success is the EFNEP staff member in the field working closely with low-income families, tailoring education to meet expressed needs.

With these program goals in mind, there isn't any reason why both programs wouldn't cooperate. And yet, this isn't always the case.

What inhibits cooperation?

- lack of understanding of each other's programs and how they operate
- lack of trust
- lack of initiative
- being territorial
- fear of losing one's identity
- fear of losing funding

The question is, how can we get beyond these inhibitors?

Collaboration doesn't happen all at once and it doesn't happen without a plan. In New Hampshire we've had a plan in place for almost ten years. That plan looks at developing a progressive relationship with specific agencies in a series of deliberate steps.

The relationship can almost be compared to a 3-legged race ... at first its rather awkward and difficult, but both have the same goals and are willing to work together to cross the

finish line. Running together becomes easier and before you know it, you almost feel like one person running the race.

Some of the steps New Hampshire WIC and EFNEP have taken are:

1. Established a solid foundation.

We established a solid foundation by first learning about each other's agencies and what the priorities were for each agency. Then we began to learn how programs were implemented and how we could dovetail services. This first step helped us think clearly about how WIC and EFNEP could complement each other.

2. Developed a sense of trust.

As we started to work together on projects, we felt a greater sense of confidence and trust in one another. Confidence and trust are critical to successful collaboration because as the cooperative ventures become more complicated, there are more risks involved and therefore more reliance on the skills and abilities of each agency. The benefit, of course, is a more efficient and productive system.

3. Work together on projects outside of our respective agencies.

Through work with other organizations, such as the New Hampshire Dietetic Association, the State WIC Nutrition Consultant and I could interact as nutrition professionals outside our respective organizations. These activities build trust, confidence and camaraderie. One activity we worked on together for the New Hampshire Dietetic Association was the first annual New Hampshire "Dietitians Against Hunger" dinner which raised over \$3,000 for the New Hampshire Food Bank.

4. On a regular basis share updated staff rosters.

Sharing staff rosters keeps everyone up-to-date and helps facilitate smoother working relationships. Sharing this kind of information seems rather basic, but many times is forgotten.

5. Share educational materials.

WIC and EFNEP share educational materials on a regular basis. We do this to provide consistency and save money. We also share book and audio-visual resource lists which enable us to borrow books, videotapes, slides and other

educational materials from each other.

6. Use each other as resource for technical expertise.

Frequently, we call each other with technical questions. Since we can't be experts in everything, it makes a lot of sense to specialize and call on those resources when needed.

7. Review each other's materials.

When we develop new materials, we always check to make sure we agree on content and make sure we can print enough to share or negotiate a reasonable price. A good example is the University of New Hampshire Cooperative Extension "Great Beginnings Nutrition Education Curriculum for Pregnant and Parenting Teens." WIC reviewed that curriculum, made suggestions for changes, and we included WIC handouts throughout the curriculum. This process only strengthens the materials that are produced. The "Great Beginnings" curriculum is part of a continuing grant to the University of New Hampshire Cooperative Extension from USDA's Food and Nutrition Service.

8. Jointly sponsor training and invite each others staffs to trainings.

On a routine basis, WIC and EFNEP share staff inservice training schedules. Many EFNEP trainings are attended by WIC staff and WIC trainings are attended by EFNEP staff. In addition to subject matter training updates, staff have a chance to learn together and see the quality of training that state staff from each other's agencies provide.

9. Joint development of nutrition materials.

In many cases it's appropriate to jointly develop materials, such as this Commodity Food Cookbook. WIC identified the recipes to include, WIC and EFNEP decided on the set-up and content, and EFNEP analyzed the recipes for nutritional content. This cookbook is in it's second printing.

10. Joint development and implementation of nutrition education modules to be delivered in WIC Clinics.

Another WIC/EFNEP project involves the joint development of nutrition education modules. Based on needs identified by WIC and EFNEP staff, these modules are delivered at WIC clinics. These nutrition education sessions provided for a second nutrition education contact for WIC clientele

and served as a recruitment tool for EFNEP. A very popular project, these modules have been used for the last five years.

11. Joint oral presentation of collaborative work at National Society for Nutrition Education meeting.

The State WIC Nutrition Education Consultant and I submitted and had accepted, an oral presentation of the WIC/EFNEP Nutrition Education Modules at the National Society for Nutrition Education meeting. It was a nice reward for our efforts!

12. Joint evaluation study on the effectiveness of "Great Beginnings Nutrition Education Curriculum for Pregnant and Parenting Teens."

This most recent project will be using WIC participants for control and experimental group members to evaluate the effectiveness of the "Great Beginnings" curriculum. The research is based on the assumption that we can document a causal linkage for nutrition education to knowledge to diet and then to a measurable impact on birth outcomes.

Working together on this research project will utilize most of the skills we've developed together and test how well we work together. I'm confident that together we'll be a success.

This University of New Hampshire Cooperative Extension research project has been funded by USDA's Economic Research Service.

With these collaborative efforts in mind, I'd like to address the 5 things we do right and the 5 things I think we need to change:

- 5 Things We Do Right:

1. We have a genuine concern for the health of our clientele.
2. We work hard to accomplish goals.
3. We utilize existing resources to implement programs.
4. We develop good programs.
5. We are open to new ideas

- 5 Things We Need To Change:

1. Rather than worry about territorial issues, we need to break down existing barriers.

2. Instead of looking inward to accomplish our goals, we need to ask ourselves who else can/should we work with to accomplish these goals.
3. Rather than competing for resources, share resources whenever possible.
4. Instead of seeing how other agencies are different, celebrate both the differences and commonalties.
5. And finally, instead of promoting only ones' own agency, promote a unified (and thus strengthened) work force.

In closing, the following are some thoughts to consider as you think about collaboration:

- How can we develop effective models for change?
- What are the barriers and how can they be broken down?
- What are the benefits?
- What are the risks?
- Finally, if you could dream, what would that dream look like?

Outlook '93

For Release: December 3, 1992

INDUSTRY RESPONSE TO CONSUMER DEMANDS FOR MORE NUTRITIOUS FOODS

Joel Johnson
President, George A. Hormel and Company

Thank you very much, Ann. On the way in from National Airport this morning, the cab driver found out that I was from Hormel and asked whether we had implemented the new labels yet. I said we quite hadn't gotten all done yet, but we were in a reasonably good position and I was quite certain that Hormel and the entire industry would respond well and quickly to these changes. But the truth is, in the back of my mind I was thinking that perhaps a good analogy was to the thrill seeker who jumped off the top of the Empire State Building and was heard to observe as he passed the tenth floor, "well, so far so good."

The major point I'd like to communicate today from industry's side is that the consumer drives our priorities. It is not the media, directly. It is not headlines. It is not nutritionists or nutritionists' conventions. And it's not the FDA or the USDA who drives our priorities. It is the consumer. Now clearly, all these institutions have a major impact on what the consumer is thinking, but we must take our guidance directly from the American consumer. We have to discern fad from serious trend in the development of new products and in the evolution of our existing products. And I need to tell you today that the American consumer is skeptical. He or she is skeptical of industry. But they are just as skeptical of government, academia and media when it comes to nutritional and food safety issues. The consumer has been batted back and forth by Alar scares, Aspartame scares, issues having to do with red dyes, antioxidants: are they good or bad? Each week brings us new information as to whether caffeine is in fact good for us or bad for us. And they have all the coffee decaffeination issues as they worry about methylene chloride, ethyl acetate, and the water decaffeination process. And yet, consumption of decaffeinated coffees continues to increase.

This skepticism is borne out by one example from my past. I spent time in the beverage division of General Foods Corporation where we had products like Kool-Aid, Tang, and Country Time and Crystal Light. Crystal Light was totally a sugar-free product from introduction and all the others had sugar-free versions.

And, a while ago, they were in fact formulated with cyclamates. When the cyclamate ban was about to come out and we realized the risk, we marshalled all five sales forces of the General Foods organization and just about everybody out of our White Plains headquarters and hit all 30,000 supermarkets within a week and withdrew that product; we asked consumers to bring the product back. They brought it back in a very orderly fashion and we got the product off the shelves very, very quickly.

Just a couple of years later, after those products had all essentially been reformulated with saccharin, there was a scare as you might recall, that perhaps saccharin was going to be banned and would have to be withdrawn. The way the consumer responded to that says a whole lot about their attitudes to a lot of the food safety issues. The consumer, hearing that these products might be banned and banned in carbonated soft drinks as well, reacted by rushing to the supermarket to buy out the stocks of products on the shelf. Clearly they were more concerned with the appearance benefits of these products than a perceived or argued or advanced health risk.

So, the consumer is skeptical in the market place. It's difficult to educate consumers when they don't trust the educators. I wonder what they're going to think when you have teenage sons and husbands trying to live on a 2000 calorie diet, How happy they are going to be? They are skeptical of manufacturers greed as they perceive it. They are skeptical of career-advancing bureaucrats. They are skeptical of headline seeking journalists. And they are very skeptical of academics anxious to publish and rushing to publish any study that they come to a conclusion on.

Since the consumer tends to drive our actions in terms of food priorities, what are the facts from the marketplace? Patrick O'Brien laid out a lot of trends before as they applied to meat, which is a primary product line of Hormel. And yes indeed, despite the headlines, it's surprising that meat consumption continues to increase on a per capita basis. It is higher today than it ever has been. There are however, important changes within the product mix, as per capita red meat consumption is down and those of poultry and fish are up sharply. Within the red meat sector, though, it's interesting to note that all that decline is on the beef side and pork consumption has held quite flat, slightly increasing on a per capita basis. We think that's due to a lot of factors. First of all: significant advances in the hog of today versus what it was 10, 20, or 30 years ago. In fact, the hog is in fact 30 percent leaner today than it was just a decade ago. There is great flexibility for the consumer in terms of the preparation of pork, and there's relative economy with pork relative to beef and other red meats.

Another fact from the market place, is that we see meat being consumed in smaller and smaller units. Meat is being used more as a condiment and used on a marinated basis. This promotes faster cooking, which is also where the consumer is going in terms of convenience. We also see ethnic trends increasing significantly. Italian food has advanced to the point where it's really American. I can't even call it an ethnic trend. But Hispanic and oriental foods are increasing sharply; both in terms of at-home consumption and food-away-from-home situations. The consumer is driven by the bright colors, the spicing, the fun, the economy of these products and interestingly, all these ethnic foods are really known for using meat in relatively small quantities on highly spiced basis and as a condiment in larger recipes.

We receive a lot of contradictory signals also as they apply to health. The people in our food service division tell us that the easiest way to kill a menu item in any restaurant is to put the heart or healthy symbol in front of it. When people are out to eat, they are out for indulgence, and I think we are going to see a retrenching in that regard. That is a killer, a kiss of death, for a product on a menu item. On the other side of the equation, when I visit my daughter in college and they have separate food lines for the students, I do note that the line is very long for the low-fat foods, and for the vegetarian foods, and that indicates a contradictory trend that you see very clearly on campuses.

On the other side of the equation, we are the largest dry sausage supplier in the country, and especially to the pizza industry. Pepperoni pizza continues to be the leading form of pizza and in fact pepperoni sales within the total pizza industry continue to increase.

We see an increasing willingness of consumers to experiment and to be very diverse in terms of their palates. We see Domino's Pizza chain suffering at the hands of Pizza Hut and Little Caesar's, because they stuck to a very limited menu offering. We see the McDonald's menu having exploded over where it was 10 or 20 years ago in terms of the number of options. We see oriental foods expanding from simply Chinese, which might have been 20 or 30 years ago to Japanese, Thai, Vietnamese, Sechuan, and so forth.

So where does this all lead us in terms of our areas of emphasis at Hormel? We are moving towards healthier meats. We believe that trend toward lower fat, lower cholesterol meats is, in fact, a real trend and not at all a fad. That is very consistent with the theme of this meeting.

In the early seventies, we were the first meat company to voluntarily nutrition label our products and we have moved very aggressively in terms of our line. Over a year ago, we introduced a Light & Lean® 97 hot dog product. And we now have an entire line of meats that are 97 percent fat free. We innovated by going to 80 percent fat free. We went to 90 percent fat free, the first in the industry, and last year we went to 97 percent. This product fully meets the new labeling guidelines and has been on the market, as I said, for over a year. And we have an entire line of these low-fat products.

We have a no-cholesterol, low fat egg substitute product in our food service unit. We have moved our products toward lower salt. We have converted our entire Austin hog slaughtering and further-processed operation to a very-thin-trim basis. As of last week, our entire slaughter there, which is about 12,000 hogs a day, moved to a tenth-inch fat trim. All the meat coming out of that plant is a tenth-inch trim. We charge our supermarket customers and our food service customers a significant premium for that and they are paying it willingly. It's hard to believe that trim can be that low. It costs us money to do it but the market is there for it.

We have increased our emphasis on poultry as have most players in the industry. We purchased the Jennie-O Company a couple of years ago. It's doing very well. We have introduced turkey and chicken products within the Hormel line. And we have the Chicken By George® product that was introduced a couple of years ago.

With emphasis on fish, on branded fish, there are a lot of consumer questions concerning the safety of fish supply. We think the way around it is to brand the products and to increase the consumer's confidence in them.

We're continuing to emphasize ethnic foods. We have a license to the Chi-Chi's trademark, at retail, and are taking that out into many products, both vegetable based and meat based. And to give you an example of just how fickle and changing the consumer is in the marketplace, it's surprising to note that today, dollar sales of Mexican sauces, like salsa, exceed ketchup. And the American consumer is going to continue to move that way. We have recently purchased an Oriental firm, the House of Tsang. We're going to be expanding that line and taking it into our other divisions as well as our grocery products unit.

We're pursuing meaningful market segmentation, kid's products, and portion size and are attempting to identify whether new products that are nutritionally superior to existing products ought to be introduced on a "light" basis (which has been the current trend for many, many products), or whether they ought to be introduced as totally new trademarks standing on their own.

Convenience, in terms of cooking time, is the final trend that I would like to emphasize. Microwaveability is absolutely a trend that's here to stay. We see a penetration of microwaves in the American households up over 90 percent and double or triple microwaves in a household starting to grow to a measurable number. The definition of convenience with a microwave has evolved as well. Consumer are not willing to transfer products from one package to a cooking vessel. They are not willing to stir; they are not willing to turn the vessel. The definition of convenience has continued to advance and we have to advance with them. Preparation is a convenience: things have to be pre-cut, pre-sliced, pre-flavored or marinated. Resealable packaging is another definition of convenience that has great application for meats. We have recently introduced a sliced pepperoni product that has a resealable tab on the front. Consumers don't have to go to the bother of rewrapping these products.

In conclusion, I'd say that from a manufacturer's perspective, this is clearly a time of change. But it's always a time of change. And these changes can be difficult to interpret. It's difficult to interpret where the consumer is today. We have to spend a lot of time with the consumer, discerning just how much they are influenced, just what is registering, just what is impacting on their real wants and needs. We look at this change as an opportunity and not really as a threat, and we are anxious to continue proceeding to innovate in the marketplace.

Thank you very much.

Outlook '93

For Release: Wednesday, December 2, 1992

HELPING SHOPPERS CHOOSE NUTRITIOUS FOODS

Odonna Mathews
Vice President, Consumer Affairs
Giant Food

I. Introduction

Good morning everyone. As the last speaker on the last panel for today's session, I have the challenge of keeping you awake and hopefully stimulated for the next ten minutes or so. Lunch will be coming soon, so you can start "thinking food" and what better place to end USDA's conference than at the supermarket. So don't worry, I plan to follow the three secrets of success in public speaking: first, be sincere; second, be brief; and third, be seated!

I've been asked to discuss how supermarkets are helping consumers choose nutritious foods. I have been involved in nutrition information programs at Giant Food for the last twenty years. I have also worked for many years with the Food Marketing Institute, our trade association, and therefore can say there are many activities and programs in place around the country to help today's confused grocery shoppers translate scientific research into reasoned and reasonable action.

Consider the supermarket industry as a whole. The Food Marketing Institute has recently pulled these issues together into a nutrition policy statement for the supermarket industry. The four basic components are:

- * Research
- * Information, Education & Marketing
- * Partnerships and
- * Public Policy

II. Research

Let's look first at research. Giant has been involved with some of the most extensive research projects designed to determine whether and how consumers will use nutrition information at point of purchase.

We started in the early 1970's with the nutrition label...and strange as it may seem, here we are 20 years later dealing with a new nutrition label. In between we have tried many off label approaches. What we have learned and what other programs, developed in cooperation with local health professionals at hospitals, universities or government agencies have shown is that successful nutrition information programs must have:

- * a long term commitment
- * a simple message and
- * cues to action.

So while my examples for my talk today will be mostly from Giant Food, you can find a number of similar programs and some published research across the country from which you can draw the same conclusions.

In case you're not familiar with Giant, we have 155 food-pharmacy stores in Washington D.C., Maryland and Virginia with sales exceeding \$3.5 billion. Our emphasis is on quality, value and service in a warm and friendly atmosphere. But even at Giant, with over 30,000 products in an average supermarket of which more than a third are foods, selecting a healthful diet is not an easy task.

My job as Consumer Advisor is to provide the consumer with the information necessary to make prudent decisions in the marketplace. Our programs are based on the premise that the consumer has the right to be informed and the right to choose. The Dietary Guidelines for Americans are the basis for all our nutrition information.

Consumers are interested in ways to improve their health, but we have found that information must be presented in ways that fit with busy schedules, competing interests, and a reluctance to make drastic lifestyle changes. Giant and other retailers across the country provide shelf labels in response to customer requests for assistance in finding foods that meet their special diet needs. Point of purchase shelf labels provide cues to action.

We have been shelf labeling products low in fat, cholesterol, sodium or calories or a source of fiber since 1981. Now there are over 5,000 products identified with this special shelf label in our stores and listed in our **Eat For Health Food Guide**, sold at the checkout. The guide lists products by brand within categories as shown on this slide. Shelf labels are probably the most successful element of our nutrition information programs. They make it easier for consumers to find foods that are appropriate for their dietary needs.

III. Now let's look at **Education, Information and Marketing**, the second component in FMI's nutrition policy.

Stores all over the country offer a diversity of printed information, brochures, booklets, newsletters, fliers and recipe programs. At Giant we are no exception. We cover topics such as "Fat, Cholesterol and Your Heart", "Foods For a Healthy Pregnancy", and "Be a Safe Food Handler." All materials are displayed at our Consumer Information Center located near the manager's office in all Giant stores. In addition, we publish a quarterly publication called "Eater's Almanac" to cover timely topics. Our fall issue explained USDA's Food Pyramid and gave menus and recipes to help consumers' achieve the pyramid eating recommendations.

The keys to success with these materials are a topic of current interest, a simple style, easily accepted food and recipe recommendations, and a graphically appealing presentation. We've learned that the layout, color, overall appeal and graphics are extremely important to get the consumer to read the message. Slick presentation isn't everything. We are committed to recycled paper, but printing costs can be minimized with the creative use of a just few colors to illustrate the point.

But cost effective as it is, print is not the media of the day. We have to supplement it with other forms of communication such as 60 second consumer radio spots or 30 second TV spots on nutrition, consumer materials or Giant's consumer programs to get our message across. We try to get a brief piece of information into each spot, but the details are in the print materials. About 25% of Giant's radio time is allocated to Consumer Affairs for topics we want to address.

We know that **repetition, repetition, repetition** is an essential ingredient in any information/education program. We need to agree on consistent health messages to be incorporated in nutrition education programs and say the same things in many different ways over a long period of time. From experience, we know that consumers often don't see shelf signs, banners, posters or other materials because they are in a hurry to get in and out of the store. Supermarkets are very busy places with lots of activity, color and noise. So that makes the need for multiple and cooperative programs even more important.

IV. This brings me to the third component, Partnerships.

Partnerships with other organizations can combine resources, strengthen credibility and save costs. Since 1978, Giant has developed and completed three major consumer nutrition information programs in cooperation with federal agencies. **Foods for Health** was the first, in cooperation with the National Heart, Lung, and Blood Institute in 1978-79. **Special Diet Alert** was the second, in cooperation with FDA from 1981-86. The third, and most recent was the **Eat for Health** program, in cooperation with the National Cancer Institute from 1987-91. While these were all research studies evaluated by federal agencies, they were also partnerships.

In addition to federal agencies, we've also worked with other organizations. A recent example is our campaign called **Healthy Start...Food to Grow On** which began in September of this year in all Giant stores. Our goal is to promote healthful food choices and eating habits for children ages 2-6. **Healthy Start** includes many partners. The program was originally developed in 1991 by 3 organizations: American Academy of Pediatrics, American Dietetic Association and Food Marketing Institute. We took the national program and added to it. Parents can find brochures as well as monthly activity fliers to do with their children. When children complete the activity, parents can take the child to the store to receive a coupon for a small reward. Here is a slide of the September flier where we asked parents to make a food pyramid poster with their children.

The fliers and rewards are paid for by commodity groups or manufacturers. In addition to these 12 sponsors, Giant also went to the President's Council on Fitness and Sports and National Association for Physical Fitness and Sport to obtain their participation, because we wanted to focus on fitness as well as nutrition for children. We also received endorsements from the local pediatric associations. Customer response has been much more than we ever expected and the monthly fliers and quarterly brochures are quite popular.

Since we wanted to encourage the Dietary Guidelines recommendation to eat five or more fruits and vegetables a day, we have developed our **Strive for Five** program. It consists of TV and radio spots, newspaper drop-ins, fliers in the produce department and at the salad bar giving practical information as well as recipes. **Strive for Five** is a long term effort to tell consumers that eating at least five fruits and vegetables a day can reduce their risk of cancer, heart disease, high blood pressure and diabetes and help control weight, too. Now the **National 5 a Day** program is a wonderful example of a partnership with government, commodity producers and retailers working together to promote the same concept. Although we came out with our own **Strive for 5** program before the national campaign began, we are 5 a day members and support it wholeheartedly.

Of course all supermarkets are part of a "unique mandatory voluntary partnership" as part of NLEA, which requires nutrition labeling of the top twenty fruits, twenty vegetables, and twenty seafood items and, under USDA, the top 45 beef, pork, lamb, veal, turkey and chicken items. Here is an example of our nutrition signs in the seafood department. FMI has provided similar materials to food retailers across the country.

V. So this brings me to the final component, Public Policy.

So far, we've talked research, information and the advantages of partnerships. So what about future opportunities to educate consumers?

We are all anxiously awaiting the new nutrition labeling regulations. We found it terribly frustrating that two leading federal agencies could not agree on one label. I am glad to hear that's now been resolved. We are deeply involved and concerned about having a clear and teachable label format consistent across all foods. We support the inclusion of Daily Values on the nutrition label so that consumers can learn how to put the numbers into the context of total daily needs. We are very concerned that the delay in regulations is to the detriment of all concerned. The consumer has no information, the educators have no tool for teaching, and the industry, which was poised to print, is going to lose millions in printing costs due to unnecessary duplications of old labels, short printing runs and other costs inherent in delay.

Despite the "E" in the NLEA, the education factor is only now being seriously discussed. While the NLEA sets the standard for some basic tools for education, such as signs and labels -- and limits the claims -- these alone will not do the job for consumers. Much more than signs and labels are needed to help consumers adequately compare and choose products in supermarkets. After all, the label itself is pretty dry. The challenge for all of us is to see how the various segments -- food industry, government, academia, educators, consumer organizations and others can work together to develop consistent, interesting and understandable nutrition messages and programs that consumers can use.

To touch one last time on the resources of the supermarket industry, FMI's Trends studies show that we have a great future in nutrition information. The segment that is most interested in nutrition is the 40 and up age group. The aging of the Baby Boomers means we will be continuing to meet the needs of an increasingly concerned population with both products and information well into the new millennium.

V. Summary

To summarize then, I discussed the four components to FMI's nutrition policy and what Giant and others have done within this framework to assist consumers in selecting a nutritious diet. First, under Research, Giant has been involved extensively in pilot nutrition information intervention studies with various federal agencies, from Foods for Health with NHLBI, to Special Diet Alert with FDA, to Eat for Health with NCI. Second, under Information, Education and Marketing, Giant has developed a wide variety of materials about foods and nutrition, available in our stores. Third, under Partnerships, Giant has gone from federal partnerships in research to broader associations with industry, commodity groups, and professional associations through 5 A Day and Healthy Start.

And finally, public policy...the postponement of the labeling regulations will be costly in terms of labels that will be needlessly reprinted and in terms of lack of information for the consumer.

Whatever results, let me remind you that I started by saying nutrition information programs require long term commitment, simplicity and cues to action. The nutrition label is part of that total picture and should be considered in the same context.

Nutrition education is a big job. There are opportunities for each of us to participate. Let's try not to duplicate unnecessarily. Let's use our resources as wisely as possible. A commitment to partnership and the consumer should guide us in research, education and public policy.

Outlook '93

For Release: Thursday, December 3, 1992

**THE PRESIDENT'S INITIATIVE ON RURAL AMERICA:
FOUR YEARS OF PROGRESS**

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A Brief History

In early 1989, shortly after taking office, President Bush appointed a sub-cabinet Working Group on Rural Development to examine the federal Government's response to rural problems. Meeting throughout 1989, the Working Group examined Federal programs in a wide range of areas, ultimately concluding that a single national design for individual programs is inappropriate to meet the diverse needs of rural communities. At the same time, it also concluded that the problem is not a lack of programs but a system that is incapable of mounting a focused and coordinated attack on rural problems.¹

The President's Initiative on Rural America, announced January 22, 1990, by then-Secretary of Agriculture Clayton Yeutter, chairman of the Working Group, called for several steps to improve the federal response:²

- Appoint a high-level President's Council on Rural America to examine the Federal Government's overall response to rural problems.
- Establish the Working Group on Rural Development as a permanent sub-cabinet level decision-making body, under the direction of the Policy Coordination Group (then known as the Economic Policy Council).
- Establish state-level councils to coordinate the Federal effort.
- Take steps to improve targeting of Federal resources.
- Demonstrate effective rural development approaches.
- Improve the dissemination of information about rural development resources and methods.³

These actions put in place the framework for what became the Administration's rural development policy for the next three years.

At this turning point in our Nation's history, it is appropriate to take stock of the achievements of the last three years and to examine the challenges that remain. That is the objective of this paper.

The Challenges

Rural America's economic problems are well-known and need not be dealt with here. They have been amply described in other reports and papers.⁴ What merits repeating, however, is the root cause of those problems.

Rural America is wrestling with fundamental changes in the world economy and its role within it. The rural economy--especially its natural resource industries--has experienced progress during this century that can only be described as amazing. Farms that once consumed enormous quantities of human resources have been reorganized into a sector that now produces great surpluses of food and fiber with far smaller levels of inputs.

The fallout of this revolution in rural America's industry is change. If the rural economy's principal industries no longer demand huge amounts of labor, we are left with the question of what to do with that labor. Labor is not, after all, a resource that can be neglected. Labor by another name is the people of rural America, our citizens, whose well being is our highest priority.

Finding solutions to this challenge has not been easy. In the first place, rural problems are not well-understood. There are many, for example, who cling to the mistaken belief that changes in farm policy can be effective in promoting general improvements within the rural economy, even though fewer than one rural worker in ten is employed on-farm and the vast majority of agricultural processing occurs outside rural America.

Nor has the Federal bureaucracy proven itself able or even willing to find effective solutions. Programs are designed and administered to meet specific needs that are not the same in all rural communities. Individual agencies jealously guard their program "turf" against intrusion from other agencies, and find themselves incapable of meaningful cooperative action, for the most part. The result is a system of isolated actions that adds up to an ill-focused and badly fragmented Federal response.

The Federal Government, of course, does not have total responsibility for rural development. Other participants include the states, local governments, and the private sector. The states in particular are major players in this arena, and their responsibility has been growing in recent years. Even more critical is the role of local governments in setting a supportive climate, providing leadership, and taking local initiative in promoting community development and growth.

The consequence is a system of government that is incapable of responding effectively to community needs. Instead, communities respond to the assistance that is offered to them, redefining their real needs so as to qualify for available resources, no matter how incomplete or badly focused the results. These are the challenges we faced three years ago.

A Review of Progress

The entire purpose of the President's Initiative has been to sweep away these challenges to government and create a collaborative partnership among established institutions to foster an atmosphere in which effective intergovernmental (and intragovernmental) policy responses are possible. I would like to review briefly the actions taken during the last three years and assess the progress we have achieved to date.

President's Council on Rural America. President Bush established the President's Council (PCRA) by Executive Order on July 1, 1990.⁵ He charged the PCRA "to advise the President on rural development policy needs and to provide guidance in setting a national policy agenda for rural economic development." Under the Chairmanship of Winthrop Rockefeller, the PCRA held seven public hearings and meetings in locations across America to hear the concerns of rural citizens and the governments and organizations working with them.

The PCRA's final report, *Revitalizing Rural America through Collaboration*, was presented to President Bush on October 26, 1992.⁶ As the report's title suggests, it recommends a series of actions designed to foster effective collaboration between the many levels of government, including local and tribal governments, and the private sector.

In effect, the PCRA's report provided an independent reaffirmation of the operating principles that guided the President's Initiative from the very beginning and continues to do so now. The report noted the importance of local initiative in rural development: rural communities must play a central role in the definition and creation of their own futures. The President's Council also called for the creation of government capacity --on all levels-- to serve as a facilitator and enabler of local action.

But the PCRA went beyond those operating principles to argue that the rural policy function ought to be elevated in stature through the creation of a White House Advisor for Rural Development independent of the current Special Assistant to the President for Agricultural Trade and Food Assistance. Thus, as the first four years of the Initiative draw to a close, the PCRA's assessment sets the stage for further refinements in the organization of the Federal Government for management of its rural development policy.

PCG-Working Group on Rural Development. One of the principal concerns of the Initiative was to establish an organizational structure for promoting cooperative action among Federal Departments and independent Agencies. From the beginning of the Initiative, this was to be accomplished through a sub-cabinet level Working Group on

Rural Development that reported to the Policy Coordinating Group.⁷

The Working Group was vested with overall responsibility for managing the President's Initiative. The principle challenge confronting the Working Group throughout these initial years has been how to transform a group of occasional meeting-attenders into a coherent force for collaboration in Federal policy administration. Some have called this effort an "unnatural act among non-consenting adults." Certainly, building true collaboration among departments and agencies which are burdened by regulations and guard their independence jealously is one of the more difficult tasks in improving our national governance.

Initially, the greatest progress was achieved at the staff level. The Working Group turned over most of its day-to-day management activities to a subordinate group of senior staff that--because of their regular Monday meetings--came to be known as the Monday Management Group (MMG). Staff support was initially provided by the USDA Under Secretary for Small Community and Rural Development and later by the Rural Development Administration (which reports to the Under Secretary), supplemented by key staff detailed from other cooperating Federal agencies.

One of the truly wonderful occurrences during these last few years has been the evolution of this group from reluctant attenders to enthusiastic proselytizers on behalf of the Initiative. Representatives from 18 departments and independent agencies and representing some 30 individual program agencies regularly participate in the work of the MMG. The commitment of this growing group of dedicated supporters is at the very heart of the success of this Initiative.

Significant challenges remain to be overcome, of course, as the role of the Working Group and MMG evolve and deepen. While the Working Group now actively seeks to promote collaborative activities among Federal agencies, these have tended to deal with the more self-evident frictions of government, and few have reached deeply into the recesses of program self-interest. If the Initiative is to achieve true and lasting partnerships among agencies, the legitimacy of the Working Group--or any subsequent organization that may replace it--to actively promote cooperation, to resolve inter-agency conflicts, and to recommend positive policy steps to the President must be established firmly.

State Rural Development Councils. The SRDCs are truly the heart of the Initiative. While the initial impetus came from the Working Group, it was clear from the start that Washington could at best play a supporting role in promoting a new vision for rural America. Rural conditions are exceedingly diverse, as USDA's Economic Research Service has amply demonstrated,⁸ and Washington is not equipped to respond to conditions in 50 very individual States. Organizing the Initiative's response at the state level provided a practical means for accommodating each area's distinct needs, while at the same time responding to the call from the Nation's governors for a "new alliance" between states and the Federal Government.⁹

While there was ample precedent for the formation of Federal-State Councils in the sphere of rural development, the experience with them has been poor. As a consequence, we decided to establish eight Councils on a pilot basis, to experiment with methods for establishing and supporting them. The first Council--South Dakota's--was launched on October 25, 1990.

In creating the Councils, we did several things that had not been tried before. First, from the very beginning we took a clear "hands off" policy concerning the organization and functions of the Councils. We intended them as a place where Federal, State, local, and tribal governments could meet with the private sector to set a common course for a state's rural areas. We expected fair representation on the Councils from each of those five partners, and we expected a serious effort to establish meaningful long-range strategies that will bring the full range of social and economic issues into play. We also expected them to operate as a forum in which the problems of bureaucratic red tape and interagency frictions could be identified and solved. But we never had a plan for each Council to follow and we never insisted that they organize in any particular way. I think this is one of the real strengths of the Initiative--that we have encouraged full, open and equal participation and a sensible approach to rural problems, *without having a particular agenda to push*.

Second, we were willing to support a senior staff person (either state or Federal) as Executive Director for each Council. We established means whereby that person could be hired, and if necessary fired, by the Council itself. This signaled our intent that the Councils themselves would be fully in charge of their own affairs, responsible only to conduct their business fairly and intelligently.

Third, we understood that effective groups are not born, they are made; groups that include as wide a range of interests as the Councils do not occur naturally, it takes time for them to develop. To promote State Councils, we asked that each one undergo rigorous orientation that encompassed the issues of rural development, the processes of effective leadership and group action, and organizational development. Much of this assistance is individualized and is conducted in-state. As the Councils develop they progress through seven milestone events, beginning with the signing of a memorandum of understanding by the Governor and ending when the Councils are operating in a collaborative manner to achieve long-term development strategies in the state.

This orientation and development assistance is offered through a common Institute format, provided by an outside cooperator (National Rural Development Institute, Madison, Wisconsin) and assisted by an MMG Institute Task Force.

After one year, it was clear that the pilot was a success. An independent assessment conducted by the University of Southern California, with funding from the Aspen Institute, concluded that after the first year's experience, states saw the Councils as a means to accomplish many of their rural development goals and adapted the Council structure to reflect their unique circumstances and experiences. The study found that the pilot Councils built valuable relationships among those in the rural policy field and

involved a wide range of organizations. In this way, the Initiative moved most of the participating states towards a broader conceptualization of rural development that encompasses community development and social services, as well as infrastructure.

On the strength of that assessment, President Bush wrote each of the remaining governors in October 1991, to invite them to form similar partnerships. Thirty-six states responded affirmatively.

During 1992, we began forming these new partnerships by signing Memoranda of Understanding with an additional 18 states, confirming our joint commitment to establish a meaningful, long-term dialogue that will lead to a more focused approach to rural development and to improvements in the intergovernmental management of rural policies and programs. We are in the process of negotiating agreements with 15 other states and 5 territories. During 1993, we expect that a total of 46 states and territories will have joined the Initiative.

Targeting and Demonstrations. It would have been easy for us to conclude, as many government initiatives have done, that what was called for in these two actions was to improve the manner in which public dollars are allocated among areas or projects. Our national tendency to equate dollars with action draws us to using funds first to promote the desired result. However, the problems of managing the public's business run far deeper than "pots-of-money," and the solutions must as well.

As a result, we concluded that targeting and demonstrations needed to be defined more broadly than simply the formulas used to distribute funding. What is needed instead is a sharper focus to all our actions, not merely to assure that the areas of the country with the most intractable problems receive special attention. Therefore, in undertaking the targeting and demonstration actions we focused on several levels: (1) to assure that all our actions are undertaken with purpose, (2) to achieve clearly understood and appropriate objectives, and (3) to remove problems--whether policy, specific program maintenance, procedures, or regulations.

It is that broader sense of clear purpose and focus that is too often missing in our public actions--a clear purpose and focus inhibited by confusing government regulations and narrowly drawn programs.

In a very important sense, bringing purpose and focus to collaborative partnerships is at the very core of the President's Initiative. It was the principal objective of the President's Council; it is imbedded in the work of the PCG Working Group and the Monday Management Group; and, it is the heart of what the State Rural Development Councils are all about.

In consequence, we decided not to undertake the traditional actions of targeting and funding demonstrations because restoring focus and purpose to our rural policies and programs is so central to the entire Initiative. Instead, we asked the Councils to undertake a strategic planning effort, and then we developed a process at the national

level to assist Councils in removing those federal impediments that limit progress on their strategic plans--their focused efforts. The supportive system at the national level attempts to remove roadblocks to rural development rooted in federal regulations or administrative practices.

I want to share three of the many Council successes we have already experienced.

One Council identified what they believed to be an unnecessary audit requirement of a community facilities loan and grant program. The Initiative proposed and placed in effect a rule change that will eliminate the audit requirement for about 4,000 small community borrowers. This single effort has the potential to save rural communities up to \$16 million a year, and \$480 million over the 30-year life of the loans. In addition, an MMG Task Force is studying how similar unrealistic federal audit requirements can be changed.

Another Council, using the non-profit private sector, with federal and state intergovernmental efforts is developing a procedure to streamline the funding application process for small business development loans. The procedure creates a standard financial application form, with a single agency to do the credit analysis for the combined four federal and six state small business loan programs.

Finally, one Council was concerned about needless duplication of different environmental impact statements (assessments). Different federal grant programs and environmental permit procedures have different environmental assessment procedures. The Council, with an MMG Task Force, is working to initiate a standard environmental review acceptable to all participating federal agencies.

Information. The Rural Information Center (RIC) is an important source of ready information about rural development, both public and private programs. The RIC is administered by the USDA National Agricultural Library and meets the critical information needs of rural officials. Activities combine the technical, subject-matter expertise of the federal government program managers with the information access of a major national library--books, journals, program manuals, and on-line databases. The Department of Health and Human Services' Office of Rural Health Policy contracts with RIC to provide a Rural Information Center Health Service (RICHS) component. Rural officials call the RIC on a 1-800 number to seek information on rural health, rural economic viability, quality of life, natural resource industries, local government services, local leadership, and community change questions.

The Task Ahead

I am especially pleased at the progress we have made during these last few years. We have taken the first steps toward bringing coherence and focus to our national approach to rural development. We have set in place an institutional framework with good prospects for a continuing effective dialogue between the Federal and State governments

and with local governments, tribal governments, and the private sector. We have reaffirmed the importance of putting local initiative first in building for the future. And we have pointed the way to making improvements in the conduct of the public's business, to removing barriers that inhibit effective action.

However, during this short period we have only begun to touch the surface of what is needed. Reforming government continues to be a critical national need. There is a good reason why Osborne and Gaebler's book *Reinventing Government*¹⁰ is such a hot seller this year; government as we know it is failing to meet the Nation's needs.

Earlier this year, we sponsored a special meeting of the National Academy of Public Administration (NAPA) to investigate what we have come to call "new governance." That meeting reaffirmed our conviction about needed steps to make government more responsible and responsive. The ideas of new governance are at the heart of the President's Initiative. I believe we are headed in the right direction. But in rural development as in all of government, we still have a long journey ahead of us.

Table I--Principles of the "New Governance"

These principles guide the "new governance":

- Being proactive, not reactive
 - Pursuing a mission and a vision, not merely administering programs
 - Serving citizens as customers, not interests as clients
 - Measuring success by results achieved, not inputs invested
 - Working through alliances with others, not independently
 - Investing resources to achieve long term payoffs
 - Working entrepreneurially, not hierarchically
 - Forming collaborative intergovernmental partnerships with the private sector
 - Insisting on flexibility and creativity, not uniformity
-

Where do we fall short? First, we continue to operate in a governmental system that is unresponsive and incapable of exercising leadership for the Nation. A major agenda

item for America is to establish new styles of government operations that will meet the emerging challenges of the 21st Century. Some of the recommendations that emerged from the NAPA meeting are shown in Table I. It is critical to our future success that we get on with this agenda.

Second, we need a new national vision of the roles and responsibilities for rural America, for what we want rural America to be. Times have changed in rural America, in some places so radically that it is unthinkable that the future will resemble the past. But our concepts of what rural America is, and what it can become, are still caught up in thinking that is no longer valid. As the President's Council on Rural America stated in its recent report, "Determining a [nation's] direction for the future means having a vision, an ideal and unique image of what life should be like and how it should be sustained. Vision is at the heart of the ability to generate purpose and commitment." We need to create that new vision before we can hope to unleash our creative energies on behalf of rural America.

Third, we need a means to manage national policymaking for rural development that channels our efforts in fresh, creative directions. By establishing the PCG Working Group on Rural Development, we have made major progress in this direction. We now have a senior policymaking organization capable of resolving interdepartmental issues and proposing coordinated policy responses to rural problems. But as the President's Council noted in its report to the President, the current institution is nearly invisible, provides little access to the President, and lacks a senior official to bring focus to the solution of tough interagency issues. The PCRA recommended a senior White House Advisor on rural development to fill these gaps. It would be a step in the right direction, but simply advising is not enough. A tough problem solver is a necessary ingredient to assist with the work of the PCG.

Fourth, we need to strengthen the collaborative relationships between the Federal government and its partners. The State Rural Development Councils have been an astounding success in this regard. If they accomplish nothing else, by bringing senior officials together from time to time they have opened up channels of communication that bureaucratic behavior and "turfism" have kept closed. But we must do more than talk with each other. We must develop shared visions and strategies for realizing them. And we must learn to work cooperatively, not competitively, to achieve them if our scarce national resources are to be used to greatest effect to enhance our long-run competitive position in the global economy.

Fifth, we must be flexible in meeting complex and varied needs, encourage our willingness to experiment, and learn from our mistakes. This has been one of the hallmarks of the President's Initiative, but it is a trait that is nearly always missing in government. One of the greatest salesmen for excellence in performance is Tom Peters, whose books have become standards in the business world during the last decade. One of his key principles is the willingness to be flexible, the need to try, to fail, and try again in the search for better ways of working. Difficult as it is for governmental leaders to admit less than total success, trying and trying again is the best teacher. In a world of

increasingly tough lessons, this is one we cannot afford to skip.

Finally, we must improve our base of knowledge and information about the world we hope to help. The Rural Information Center has been a big step forward in putting practical information into the hands of rural leaders. But it falls far short of meeting all the needs. We have learned many things about rural America in the last decade; perhaps the most important lesson concerns rural diversity, the complexity of rural needs, and the unique situations that exist in many parts of rural America. But the level of our knowledge about the rural economy, or the changing conditions within the rural population, is appallingly poor. We have invested large amounts of resources in certain industries--especially in knowing minute details about the agricultural industry--but we know almost nothing about the changes taking place in textiles or metal working or electronics and how these changes give rural citizens new opportunities or threaten them with difficult changes. Where most of rural America is concerned, our heads have been in the sand. It is time to redirect our resources to develop a base of basic information and applied knowledge that will inform our policies for rural development.

Conclusion

We have achieved a lot in the last four years, but there is far more yet to be done. From what I have seen in my travels around America, meeting with state and Federal officials, local governments, tribal representatives, and people in the world of business, I am convinced that we have all the talent we need to tackle the job that lies before us.

But the task that confronts us calls for bucking tradition. We will need to refocus our government. We will have to define new visions of who we are as a Nation and where we want to go. We will have to give bureaucracies new methods of carrying out the business of governance. We will have to redirect our investments in areas that offer higher payoffs in building a stronger future. The real question that all of us must answer, then, is this: do we have the will? Only time will tell.

NOTES

1. The Working Group's efforts benefitted from a simultaneous Rural Revitalization Task Force within the Department of Agriculture, which issued its report, *A Hard Look at USDA's Rural Development Programs*, to Secretary Yeutter on June 30, 1989.
2. The Working Group's final report, *Rural Economic Development for the 90's: A Presidential Initiative*. (January 1990), was issued at the same time.
3. Additional details about the philosophy and goals of the PIRA are presented in Walter E. Hill, "Building a Better Rural Policy: The President's Rural Development Initiative," Speech at Outlook '91: The Annual Agricultural Outlook Conference, Washington, D.C., November 27, 1990.
4. Walter E. Hill, "Current Federal Rural Policy Efforts," GAO Rural Development Conference, Washington, D.C., 1992; "Making Rural Policy for the 1990s and Beyond: A Federal Government View," Speech at Outlook '92: The Annual Agriculture Outlook Conference, Washington, D.C., December 5, 1991; National Commission on Agriculture and Rural Development Policy, Future Directions in Rural Development Policy, December 1990.
5. Executive Order 12720, July 16, 1990.
6. President's Council on Rural America, *Revitalizing Rural America Through Collaboration: A Report to the President*, October 26, 1992.
7. Originally called the Economic Policy Council and under the Chairmanship of the Secretary of the Treasury, it was renamed the Policy Coordinating Group under White House direction in the Spring of 1992.
8. Lloyd D. Bender, et al. *Diverse Social and Economic Structure of Nonmetropolitan America*. (Washington: U.S. Department of Agriculture, Economic Research Service, 1985).
9. National Governors' Association, *New Alliances for Rural America*. Report of the Task Force on Rural Development (Washington: National Governors' Association, 1988).
10. David Osborne and Ted Gaebler, *Reinventing Government* (Reading, Mass.: Addison-Wesley Publishing Co., Inc., 1992).

Outlook '93

For Release Thursday, December 3, 1992

CANADIAN RURAL POLICY: AN ALTERNATIVE APPROACH?

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ABSTRACT

Rural policy in Canada has been no more successful in resolving rural problems than rural policy in the United States. Despite the ongoing nature of the development problems in rural areas in Canada, looking at Canadian rural policy can provide useful information. My focus is on differences in how the two nations have managed rural policy and the potential lessons from Canada for the United States¹.

Growing economic integration between Canada and the United States is almost necessarily leading to greater comparison of economic policies in the two countries. Policies are compared to assess differences in levels of support that affect the competitive position of each nation, and to see if there are lessons that can be learned in terms of domestic policy initiatives. My task is to suggest the extent to which the Canadian experience in rural policy can provide useful lessons for the United States.

Similarities between rural conditions in Canada and the United States are striking, suggesting that the nature of the policies used to improve the condition of rural areas might also be similar. In terms of economic activity and relative economic standing the rural populations in the two countries are quite comparable. However, as you move beyond an examination of economic indicators the resemblances become more strained. While rural development is clearly based on economic activity, it also reflects an embedded sense of broader social relationships and values. And there are decided differences in the nature of the

¹ This paper has its origins in an article prepared for Rural Development Perspectives that provides a more detailed discussion of Canadian rural policy (Freshwater, 1991).

TABLE 1: SELECTED SOCIO-ECONOMIC INDICATORS:
CANADA AND THE UNITED STATES

	CANADA	UNITED STATES
POPULATION		
PERCENT RURAL (1986)	23.0%	23.2%
PERCENT FARM (1986)	4.0%	2.2%
UNEMPLOYMENT RATE		
RURAL (1989)	8.8%	5.7%
URBAN (1989)	7.1%	5.2%
EMPLOYMENT GROWTH RATE		
RURAL (1986-1989)	4.5%	6.9%
URBAN (1986-1989)	10.4%	7.2%
SHARE OF RURAL EMPLOYMENT BY SECTOR (1989)		
AGRICULTURE	12.0%	9.0%
MANUFACTURING	17.0%	18.0%
SERVICES	28.0%	26.0%
AVERAGE FAMILY INCOME		
RURAL (1990)	\$36,700	\$23,709
URBAN (1990)	\$41,000	\$31,823
RURAL SHARE OF POVERTY (1986)	7.0%	29.0%
PROPORTION BELOW POVERTY LINE *		
LARGE URBAN	20.0%	16.7%
SMALL URBAN	19.0%	8.0%
RURAL	17.0%	16.3%
EDUCATIONAL LEVEL		
SOME POST-SECONDARY (1988)		
RURAL	25.0%	34.0%
URBAN	32.0%	52.0%
LESS THAN HIGH SCHOOL (1988) **		
RURAL	21.0%	28.0%
URBAN	14.0%	20.0%

* FOR CANADA LARGE URBAN IS CITIES LARGER THAN 50,000, FOR THE U.S. LARGE URBAN IS METRO CORE. SMALL URBAN IN CANADA IS LESS THAN 50, AND FOR THE U.S. SMALL IS NON-METRO CORE.
DATA ARE 1988 FOR CANADA AND 1987 FOR U.S..

** IN CANADA BELOW GRADE 9, IN THE U.S. BELOW GRADE 11

Canadian and United States populace in this regard. Policy must also reflect the particular structure of government in each country. While both Canada and the United States are federal systems, the structure and distribution of powers within the two sets of governments differs considerably.

This suggests that while there are certainly lessons to be learned by examining the Canadian experience, but these lessons will be more difficult to interpret than might at first seem to be the case. Although some policies and programs are directly transferrable into a U.S. context, many will require considerable adaptation, and others will prove to be irrelevant.

Perhaps the current debate over U.S. health care reform is the best illustration of this situation. Canadian health care is neither the panacea, nor the failure that it has come to be pictured in the United States. In a rural context, the Canadian public may have greater distance to travel to a hospital than do their U.S. counterparts, because of more stringent controls on hospital locations. At a rural hospital in Canada, just as in the United States, one is likely to find shortages of medical personnel and less advanced technology than at hospitals in urban areas. But, unlike in the United States, access to health care is not based on the ability to purchase health insurance, or on a past medical history that reflects no significant illness. Canadian farmers do not have to worry about whether they can afford to purchase individual insurance policies to provide coverage for their families, since each province operates a single insurance pool that covers all residents. Should the United States adopt the Canadian health care system? Certainly not, because the pattern of health care has evolved differently here, but there are elements of the Canadian system that deserve careful consideration in U.S. health care reform.

PARALLEL RURAL PROBLEMS

Canada and the United States share a common heritage and development path. Over time the two nations have developed increasingly strong economic and social ties. This makes Canada a useful comparison when examining public policy, both in terms of definitions of the problem and approaches to address them. The nature of the rural development problem in each country is roughly similar (Table 1)². Both countries are primarily urban in terms of population location. In both countries the expansion of world trade is causing major disruption to traditional rural

² Comparisons in this table should be made with caution. Definitions are not consistent between the two countries, so while order of magnitude associations can be made one should not go beyond this type of comparison.

industries. Agriculture remains the dominant land use in the inhabitable portions of each nation, even though it is no longer the principal rural economic activity. Both economies, including the rural portions, are dominated by service activities and to a lesser degree manufacturing. And levels of rural income and employment persistently lag behind those in urban places. Poverty is an equally pervasive problem in rural Canada as a percentage of the rural population, but rural poverty is a smaller proportion of total poverty. Rural residents in both countries tend to have lower quality education systems, less access to services such as health care, and tend more often to fall between the cracks in terms of coverage by basic social programs.

Most importantly, both Canada and the United States are large countries with a great amount of regional diversity in terms of economic and social conditions and the resulting set of problems and potentials. As we approach the consideration of a North American Free Trade Agreement (NAFTA) and look at the effect of the Canada United States Trade Agreement (CUSTA) the importance of these regional differences becomes crucial. For those interested in rural policy these regional differences should be a central issue. Perhaps the best description of the nature of the regional problem that is embedded in the rural policy problem of Canada and the United States is given by Garreau's description of the "Nine Nations of North America" (Figure 1). Garreau's concept reflects the fact that economic and cultural groups can transcend international boundaries, just as they transcend state boundaries. But the fundamental differences between Canada and the United States discussed above are superimposed on these "Nine Nations" (Lipset; Freshwater, Apedaile and Ehrensaft).

DIFFERENT APPROACHES

Important differences exist in the perceived role of the state and individual in the two societies. Canada for a number of reasons has adopted an institutional structure that allows a greater role for government in managing resources and directing the path of development. The Canadian health plan is one example of this difference. So too are federal ownership of half the rail system, compulsory marketing boards for a number of major agricultural products and a more aggressive role by government in activities that can roughly be termed industrial planning.

In addition the distribution of powers in the two federal systems differs. Provinces are much stronger than states in terms of their direct powers, and the federal government in Canada has had far less success in bypassing the provinces and dealing directly with citizens and local governments than has been the case in the United States. In rural areas in Canada there is no

Figure 1



Based On Garreau, 1981

strong federal presence like the Cooperative Extension Service that would allow program delivery by the federal government even if the federal government were able to develop one. All current evidence suggests that the powers of the federal government in Canada will be further diluted in an effort to preserve national unity, making a dominant federal role even less likely.

The effect of these differences on rural policy has been significant. If one looks at specific programs used to assist rural areas in the two nations there is great similarity. This reflects the common nature of the problems in rural areas and the simple fact that there are a finite number of things that can be done to address them. Where there are significant differences is in the policies that blend individual programs into broad strategies.

Perhaps the single element that best characterizes the differences in approach between the two nations is that rural policy in Canada is a minor component of broader regional policy which has a primary focus on assisting people through generally available programs. By contrast, in the United States rural policy as described by Rasmussen exists as a free standing policy area, mainly oriented to rural businesses and communities.

The absence of a specific Canadian rural policy is rationalized on the following basis. To the extent that less well off individuals benefit disproportionately from assistance, and to the extent that rural areas have a higher proportion of poorer people, equalization benefits accrue disproportionately to rural areas removing the need for a specific rural policy.

This is not to say that Canada has not attempted major place specific interventions. In the 1960s and early 1970s major outlays were made by the Department of Regional Economic Expansion (DREE) to improve employment prospects in low income, high unemployment areas. Industrial relocation grants and loans were made available to businesses that would either expand or move to designated areas. Initially, the program was targeted to areas with clear disadvantages, including rural areas, but over time eligibility criteria were relaxed to the point that virtually the entire country became eligible. Analysis of the effects of the program showed that costs per job created were high, there tended to be significant displacement effects from new businesses driving out existing enterprises, and the survival rate of firms once the advantage of cheap federal financial assistance was dissipated was not good.

By the mid-1970s the focus of DREE activity had shifted to a more integrated approach. Individual provinces and the federal government signed multi-year General Development Agreements (GDAs) that specified strategies for improving particular sectors

and regions. These strategies included business development assistance, financing for infrastructure improvement and programs to improve job skills of the labor force. Each level of government contributed resources, but implementation was primarily a provincial responsibility. The GDA established a framework or strategic plan and individual subsidiary agreements were signed to implement the pieces of the plan. The approach allowed integrated rural development to be attempted in provinces where this was a major issue, primarily in the Maritimes and the Prairies.

There was however no strong federal commitment to rural development; in fact the majority of the funds went to urban areas. This reflected the popularity of growth pole arguments in Canada at the time. It was believed that stimulating growth in a central place would cause the surrounding rural hinterland to experience growth from the trickle-down effects.

As time passed, the complexity of the GDAs increased and the federal government became increasingly concerned that it was providing the bulk of the funds, while the provinces were getting the bulk of the credit, since they controlled program delivery. Revisions in 1982 reorganized DREE and changed its name to the Department of Regional and Industrial Expansion (DRIE), and changed the name of the GDA program in an attempt to emphasize the federal role in the direct delivery of benefits. This was a generally unsuccessful effort because the federal government had no capacity to deliver program benefits and the provinces had no interest in letting it develop the capacity. In 1985, DRIE was abolished and the GDA program was phased out.

Running in parallel with the DREE/DRIE activities has been an ongoing concern with labor force development. The only area where the federal government has unambiguous control of local program development and delivery is unemployment benefits³. Consequently, there has been an ongoing effort to use this vehicle as a tool for federal activity. Various job training and relocation assistance programs have been created over time. Perhaps the greatest influence the federal government had on rural areas was the decision in 1971 to greatly increase unemployment insurance benefits, expand eligibility and extend benefits for a longer period in high unemployment areas. This program provided a major infusion of funds into many small communities in the Maritimes and in the North, allowing their residents to remain in the community. At the same time, programs were developed to assist people in developing the skills to allow

³ Even here a number of provinces are making a concerted effort to take back this authority.

them to relocate if they chose and to assist them in finding a job in a new location.

During the period there was an ongoing debate over the desirability of providing people with the skills and incentives to facilitate relocation to more prosperous areas with labor shortages, or attempting to provide better opportunities for business creation and expansion in surplus labor areas to allow people to remain in their communities. Not surprisingly, the provincial governments favored the latter approach since federal assistance was based on population.

DREE activities in the 1970s, with their focus on expanding income and employment in disadvantaged communities; the relatively high level of unemployment benefits provided by federal unemployment insurance; and high prices for primary products, led to a noticeable improvement in living conditions in many parts of rural Canada. However, in the 1980s it became clear that much of the improvement was primarily based on transfer payments, rather than a fundamental strengthening of local economies. As support from the government declined, so too did local income and employment.

Just as in the United States, the recession of the 1980s had a major effect on rural areas. And, just as in the United States the recession was accompanied by a change in political philosophy that stressed market forces and a growing federal budget deficit. An increasingly urban society facing major problems of its own was not prepared to deal with rural issues. Just as in the United States, farm groups were able to obtain additional support but other rural residents faced lower levels of government support.

Unlike in the United States, the nature of the Canadian political system does not allow the federal government to provide much in the way direct support specifically to rural residents. Since virtually all aspects of rural life fall under provincial jurisdiction, rural residents must look to their provincial governments for the bulk of government assistance. However, in many cases provincial governments have been unwilling or unable to provide a lot of support. Poorer and smaller provinces that tend to have higher proportions of rural residents, such as those in the Maritimes and Prairies, lack the funds to implement their own programs. Wealthier provinces have more resources, but rural residents are a relatively small share of the population and urban problems are higher priorities. As a result, rural people have too often fallen between the cracks.

Almost a quarter century of federal funding for broad development activity resulted in a presumption that the federal government would always be willing to fund domestic economic

development activity as part of its equalization mandate. However this is no longer likely to be the case. Although the principle of equalization transfers from the federal government to the provinces remains an important feature of the Canadian federal system, the ongoing debate over federal and provincial powers is reducing both federal powers and financial resources. The effect is a diminished capacity to engage in economic development activities, including those in rural areas.

Certainly the core set of social support programs, including health insurance, old age pensions, education assistance and extended unemployment insurance programs can improve the quality of life of those residing in economically disadvantaged areas by providing them with services they could not otherwise afford. However, providing social services need not enhance local economic development. Higher levels of support may impede the incentive to relocate from high unemployment areas to low unemployment areas and thereby increase rigidities. Once uniform levels of social services are provided outside the work place, access to these services is not a criteria for either worker or employer. Consequently, location decisions are made on other grounds.

But improved access to social services in rural areas does not imply uniform access. Differences in levels of service still exist between rural and urban places. For example, the Canadian health care system guarantees that all patients have uniform access in the sense that ability to pay is not a criteria. However there is no commitment to providing uniform access to service irrespective of geographic location. Low population density areas in Canada face the same problems as similar areas in the United States of attracting doctors, justifying hospitals and providing more than basic emergency services.

RECENT TRENDS IN RURAL POLICY

In the last ten years a significant adjustment in policies affecting rural areas has taken place. Growing federal provincial conflicts have made it difficult to operate the type of partnership program managed by DREE/DRIE. Tighter budget constraints and a desire for greater political recognition also reduced the federal governments interest in transferring funds to the provinces. However, growing economic disparities among various parts of the country have created tensions that need to be addressed. In addition, the current federal government sees less of a role for interventions that have the potential to block market forces.

Both budget restrictions and a more market oriented political philosophy have led to reductions in the duration of unemployment insurance benefits, cuts in the growth rate of

federal support for health and education programs, and a phasing out of the direct economic development assistance provided under GDAs. In addition, rural areas have experienced the effects of reduced rail transportation subsidies, termination of rail passenger service in a number of areas, and a significant reduction in the number of rural military bases, all of which have tended to adversely affect rural areas.

The primary source of federal support for rural communities in the 1980s has come through the Community Futures program operated by Employment and Immigration Canada. Since Community Futures is targeted to small, often single industry towns, it has a relatively strong rural focus. Community Futures is a locally based self-help program that tries to get individual communities to work toward strategic planning for economic development. The federal government provides funds for both planning purposes and for business and infrastructure development. The program continues two broad thrusts of Canadian policy; the idea of comprehensive planning for development and the use of unemployment insurance as the entry point for the federal government in domestic economic development.

The objective of the Community Futures program is to develop resources within a community so that it can be self-sustaining. Resources include capital, planning skills, infrastructure and labor force skills. Initial infusions of federal assistance in the form of money and technical assistance are viewed as seed capital that allow the community to begin the growth process. Local committees drawn from the community provide core leadership and direction for the program. Federal assistance is justified on the grounds of providing opportunity, and as a long term budget saving activity if unemployment claims are reduced.

The broader regional equalization mandate that was the traditional focus of the federal government is now being served by two new federal regional development agencies: the Atlantic Canada Opportunities Agency (ACOA) and Western Economic Diversification Canada (WEDC). These two agencies have a mandate to improve economic development in their respective regions. ACOA has adopted a traditional strategy of integrated planning and long term development agreements with provincial and local governments in the Maritime provinces. The focus is on small business and small communities. By contrast, WEDC has concentrated on financing large business development in major metropolitan areas in the Prairie provinces.

The contrast in approaches of these two agencies reflects two themes in Canadian development strategy. One is the use of comprehensive planning and coordinated investments by multiple levels of government, the other is the reliance on fostering economic development in growth poles. Both have shown success

and failure in the past, so there is no reason to prefer one over the other. In fact given the differing problems of the western and Maritime provinces the difference in approach may make sense.

LESSONS FOR THE UNITED STATES

This all leads to the question of what there is in the Canadian experience that can be useful in thinking about rural policy in the United States. The most general benefit from looking at experiences in another place is that it provides a new reference point for examining patterns of behavior that are so common they seem natural. Yet, if they are only common here, perhaps they are not as natural as we might think. The following set of points describe six specific issues that are central in assessing rural policy.

POINT 1: Locally based development is widely perceived as the best way to ensure ongoing success, but how can the federal government effectively provide assistance?

Canadian experience shows that simply providing large transfer payments to individuals is not sufficient. When the transfers are withdrawn the local economy collapses. However the Community Futures program provides significant amounts of federal financial assistance, but it also supplies technical assistance. And most importantly it requires that the community organize to develop a coherent strategic development plan that has broad popular support and commit itself to implementing the plan over a five to ten year period. This also requires the federal government to make a similar five to ten year commitment to the community.

POINT 2: Is it better to charge a single agency with economic development responsibility in rural areas or spread the responsibility more broadly.

In the United States, USDA has the lead responsibility for rural development activities. In Canada while there have been efforts to centralize rural development in particular agencies, for example the DREE/DRIE experience, rural development has never been assigned as a specific responsibility. In predominantly urban nations like Canada and the United States when urban and rural interests directly compete the tendency is for urban interests to dominate. This suggests that USDA should continue to be responsible for rural development because of its inherently rural orientation.

POINT 3: Is it better to emphasize rural policies that follow a sectoral or community basis, or to focus on people based rural policies?

Canada has experimented with both of these approaches to a greater degree than has been the case in the United States. On balance people based programs have been more successful in Canada, both in terms of their impact on the community and as being politically acceptable. People based programs are not seen as benefitting one community or sector at the expense of another, and improvements in human capital are generally perceived as providing benefits to the nation even if the assisted individuals leave their rural community.

POINT 4: What types of policies have the greatest influence on rural development?

Policies can be classified into three broad types; - sectoral, social and macroeconomic. Sectoral policy deals with particular industries including agriculture, forestry, mining and energy. To the extent that sectoral activity such as agriculture is concentrated in rural places, sectoral policy has been considered synonymous with rural policy. Rural areas have traditionally looked to commodity based sectoral policy for relief when times have become tough. Yet such policy is becoming increasingly ineffective because global economic integration blunts opportunities to use commodity policies and because politically there is a greater willingness to accept market driven outcomes.

Social policy, by contrast, is oriented to shifting risk from individuals to the collective population. Included among these policies are unemployment insurance, medical care, education, cultural affairs, social welfare and other similar programs. While these programs do not have a direct development function they do provide income transfers and support functions that can enhance development activities. Social policy is not particularly rural.

Neither is macroeconomic policy oriented to rural areas. Yet macroeconomic policy covers the broad set of fiscal and monetary policies and external trade relations that determine the broad economic environment for the rural economy. It tends to be applied uniformly across regions, and between rural and urban places. Though the policies are uniform, the results will vary for regions, sectors and rural places. More importantly the particular policies chosen are selected with an eye to meeting the needs of dominant areas and groups.

In both Canada and the United States recent experience suggests that macroeconomic policy has had the largest impact on rural areas. The eroding rural economic base reflects changes in the larger world, not changes in policies specifically targeted to rural areas. Social policy can provide a safety net and sectoral policy can provide short term buffering from the adverse impacts of macroeconomic policy that is oriented to serving larger national needs. This suggests that specific rural policies should be sensitive to the direction of macroeconomic policies.

POINT 5: Development is increasingly seen as involving a series of public-private partnerships that allow various actors to pool their resources to create the critical mass necessary to bring about growth. The critical question in this process is how one goes about creating the network of partnerships.

In the 1970s and early 1980s the Canadian federal government relied on federal provincial partnerships to deliver development assistance. From this experience it is clear that while partnerships at this level can deliver programs to communities they do not usually result in ongoing growth. The Community Futures program represented the first significant effort by the federal government to form partnerships with local leaders. Significantly, the program does not rely on local elected officials for its contact with the community, although a number of the community board members are often elected officials. More recently a number of provincial governments have tried to bring about partnerships for development, in part to ensure that the federal government is precluded from a greater role in dealing with local governments.

An underlying objective of the CF program was to develop stronger links between business leaders and community leaders and between clusters of communities that were functionally integrated. In this respect the program has been quite successful. New alliances have been formed at a local level in many communities because federal government funding provided through the Community Futures program provided a reason for cooperating and a forum for building cooperation.

What this suggests is that while local partnerships are necessary for successful development, it may take an external force to bring these partnerships about. Inertia is a strong force in rural communities that may only be overcome with an outside stimulus. In addition, the stimulus needs to be sustained for a long enough period to ensure that the new behavior patterns take root.

POINT 6: Are transfer payments that support infrastructure and social services a useful development tool?

The Canadian social and political system has accepted the desirability of transfer payments to equalize income and access to social services as a basic principle of government. In the poorest Maritime provinces transfer payments account for over half of the provincial government revenue and help to bring average personal income closer to levels in the central provinces. After close to fifty years of following this policy its success in stimulating development is unclear.

While transfers may be justified on social grounds they have shown little ability to help promote growth. Transfer payments ensure that: the basic set of social services is relatively constant across Canada, schools do not vary greatly in quality from province to province, local tax burdens are not that different, and the level of physical infrastructure is relatively uniform. However, the areas that were marginal when these programs began remain marginal today. While these are better places to live, the outlays have not made them economically self-sustaining.

CONCLUSION

In summary, there are clear differences in rural policy approaches between Canada and the United States despite the similar nature of the problems facing rural areas. Canada has rarely had formal rural policies and has had far less of a federal influence in rural areas. Canadian federal policies have tried to correct regional disparities through generally available programs of industrial assistance, human capital improvements and equalizing access to basic social services. In Canada the focus in the post World War II period has clearly been on equalizing levels of income across provinces, and providing employment opportunities throughout the nation. Rural areas have rarely been explicitly targeted for special assistance. Canada has also emphasized long term comprehensive planning and integrated programs involving multiple levels of government far more than in the United States.

The Canadian approach to rural development differs from that adopted in the United States in a number of other ways. The Canadian emphasis has been on fostering growth poles to stimulate economic activity in functional regions, and on ensuring uniform access to a broad set of social services. Small areas have not received the degree of political support that exists in the United States. In addition, there has been a strong undercurrent of support for comprehensive planning. By contrast, the United States has stressed rural areas as distinct entities and

emphasized direct assistance to businesses and the provision of infrastructure as key development strategies.

What can be taken from the Canadian experience? It is clear that national rural economic development strategies designed to provide uniform programs to all parts of the country miss the mark. What is needed on the east coast is not what is needed in the Great Lakes area. In both countries there is a growing recognition of the importance of recognizing diversity in developing programs. Perhaps the sensible approach in analyzing programs from another country is to look at what has worked in a region comparable to the one you are interested in and see if it is applicable to that specific case, but recognize that institutional and cultural differences may make transferring the program difficult.

More specifically, the revived interest in block grant transfers to the states to allow them to implement programs is similar to longstanding Canadian programs. What is clear from the Canadian experience is that providing a source of revenue may not be enough to bring the province/state to a point where it addresses root problems. Nor is it clear that expanded transfer payments to individuals have a long term effect in terms of reviving local economies. Canada's experience in the 1980s suggests that local economies based primarily on federal transfer payments do not create the internal dynamics to weather reductions in those payments.

But the Community Futures program does suggest that sustained support of locally based development can be successful. New efforts like Community Futures should be monitored. Comprehensive long term assistance in planning and implementation of development strategies is something that is too often only given lip service in both countries, but the little that we know about successful rural development suggests that it is the appropriate way to go.

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Outlook '93

For Release: Thursday, December 3, 1992

THE GEOGRAPHY OF RURAL DEVELOPMENT IN THE 1980'S

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The geographic context of rural areas has a significant effect on their economic development. By geographic context I mean the broad set of economic opportunities that accrue to a place by virtue of both its size and its access to larger economies. And, by access to larger economies I mean proximity to centers of information, communication, trade, and finance through which it connects to the even larger national and international marketplaces.

The data I'm presenting will show that access to large metro areas is a boon to surrounding rural counties. Smaller metro areas don't provide quite the same benefit to rural counties surrounding them. And, for those rural counties without immediate access to metro areas, having at least a moderate size city increases growth.

By definition, rural communities are small, low density settlements. But all opportunities available to rural residents and businesses are not restricted to their immediate area. Those living in counties adjacent to a metro area may work, use hospitals, take college classes, or attend entertainment events in the city. Our biggest cities, the centers of metro areas of 1 million population or more, are the headquarters of many multinational firms and financial institutions, major nodes in telecommunications networks, and centers for national sports teams, opera companies, symphony orchestras, and museums. Our smaller cities, the centers of metro areas of under 1 million, house a wide variety of economic and social opportunities, but not of the breadth or depth of those in the major cities. Access to these metropolitan areas provides a wide array of social and economic opportunities to rural residents and businesses that gives their development potential a boost.

For nonmetro counties without access to metro opportunities, the data suggests that the size of their own urban population centers is critical to development. Larger nonmetro cities are likely to have public transportation, a commercial airport, a daily newspaper, radio and television stations, a variety of financial institutions, and other infrastructure providing information about and access to the national and international economies. To investigate what a city of at least moderate size does for a nonmetro county, I've divided nonadjacent nonmetro counties into those containing all or part of a city with a population of at least 10,000 and those without any part of a city that large.

These categories are based on 1980 county and city populations. County and city populations have changed since then. However, measuring from a 1980 base shows the levels of population, employment, and income change during the 1980's associated with starting out the decade in each context. Also, nonmetro counties are defined as adjacent if they physically abut a metro area and have at least 2 percent of employed persons commuting to the metro county(ies) containing the central city. When a nonmetro county met the adjacency criteria to more than one metro area, it was designated as adjacent to the metro area to which the largest percentage of its workers commuted. These classification rules explain why the map (figure 1) shows some nonadjacent nonmetro counties next to metro areas and why it shows some nonmetro counties that are adjacent to both large and small metro areas as adjacent to the large metro areas and some as adjacent to the smaller metro areas.

This classification reveals one of the major ways in which the economic opportunities available to rural areas vary. Other factors internal to each local area also affect development. For example, entrepreneurial skill and community cooperation are important factors in a local area's economic development. After I describe the geographic context for growth in rural areas, I will summarize the development policy implications of my findings, and end with a short discussion of other factors affecting local growth.

Population Change

The population of large metro areas grew by 12 percent from 1980 to 1990 (table 1). Nonmetro counties adjacent to the large metro areas experienced population growth of 10.5 percent, close to the large metro rate. These nonmetro areas may be balancing the development they are experiencing from metro migrants seeking less dense, less expensive housing with the desires of longer-term residents to maintain the "rural" quality of life. Members of this group of nonmetro counties are also the most likely to be added to the metro category when the Census Bureau redraws metro-nonmetro boundaries based on 1990 commuting data.

Those nonmetro counties adjacent to the smaller metro areas did not receive the same kind of boost from their location. While the smaller metro areas grew almost as fast as the larger metro area, their adjacent counties grew only half as fast as they did.

At the other end of the nonmetro spectrum, nonadjacent counties without a moderate size city actually lost a small proportion (less than 1 percent) of their 1980 population over the decade. The nonadjacent counties containing a moderate size city experienced moderate population growth.

Changes in the age distribution of the population in these county groups have implications for development strategies. Children under 18 years old and people 65 and older are generally defined as the dependent population. The children are predominantly in school and dependent upon parents for economic support. The elderly are generally retired and dependent upon social security, pensions, and earnings from investments, all sources of income unrelated to current local job opportunities. The working-age population, those 18 to

64, most often depend on the amount and type of work they and other working-age family members do, making employment opportunities of utmost importance to them.

Nationally, the proportion of children fell while the proportions of working-age and elderly people increased over the decade. Metro areas maintained their advantage over nonmetro areas in a higher proportion of working-age people. Among nonmetro county groups, the nonadjacent counties without a moderate size city had the lowest proportion of working-age population. They also had the highest proportion elderly. Although the elderly are seen by some researchers as the basis of a rural growth industry (i.e., attracting higher-income elderly migrants will, in turn, lead to growth in retail, health, and service jobs), many of these nonadjacent-no city counties are not meccas for that group of elderly. These counties simply have not had the employment opportunities necessary to retain working-age people. They lose working-age migrants to areas with opportunities and are left with a larger proportion of elderly.

Educational Attainment

Another area of debate is the role of education in rural development strategies. Nonmetro areas have perennially had lower proportions of high school and college educated people than metro areas. The educational distribution in 1990 is no exception. Educational attainment data from the 1980 and 1990 Censuses are not strictly comparable. In 1980, respondents were asked how many years of schooling they had completed. In 1990, respondents were asked how many years they had completed and if they had earned a high school (including GEDs), associate's, bachelor's, or graduate/professional degree. The percentages compared here are those who completed 4 years of high school in 1980 with those who obtained a high school diploma in 1990, and those who completed 4 years of college in 1980 with those who obtained a bachelor's degree by 1990. The 1990 percentages are probably somewhat lower than they would be if the 1980 questions had been asked. However, there is no way to adjust either variable to match the other.

Both metro and nonmetro educational attainment increased markedly from 1980 to 1990, but high school completion rates in nonmetro areas in 1990 are only as high as metro completion rates were in 1980 (table 2). And, in completing 4 years of college, nonmetro areas still lag the 1980 metro rates. Among nonmetro areas, the nonadjacent counties without a moderate size city have the lowest high school and college completion rates, another indicator that they do not have the job opportunities to retain highly educated, working-age people.

Interestingly, the nonadjacent counties with a moderate size city have the highest percentage of college completion among nonmetro groups. Those counties may be more likely than the other nonmetro types to have small college campuses or small hospitals and the highly educated faculty/health professionals that work at them. [At the extreme is Los Alamos, New Mexico, one of these counties and the site of a major Federal nuclear research lab staffed with highly educated scientists.] The adjacent counties may not have such institutions because the metro areas they are attached to do, and the other nonadjacent counties may not have the population concentration to support such facilities. This is conjecture; further investigation is needed to pinpoint the source of the nonadjacent-moderate city group's educational advantage.

The debate over the importance of educational attainment for development is of the "which comes first" variety. Does a rural area need a highly educated population to attract job opportunities or do the highly educated move to job opportunities? From migration studies we know that the young, highly educated are the most mobile group in the population. This propensity to move suggests that they won't stay in rural areas waiting for development to happen, but they would move to rural (or urban) areas with job opportunities. Development studies ERS conducted some years ago in fast growing rural areas in Kentucky and Georgia found that many of the immigrants who took new jobs had lived in the areas previously and were returning after working elsewhere (Carlin and Coltrane, 1983). The highly educated migrants rural areas have lost to the cities may be a ready pool of returnees if nonmetro jobs requiring their skills become available. The key ingredient may be the entrepreneurial initiative to start viable businesses in nonmetro areas that require a more highly educated work force.

Industrial and Occupational Structure

Their low population density means that most rural areas cannot attain agglomeration economies as a means of attaining a competitive edge. A small number of local businesses are not a large enough base to support local business services, such as accounting, engineering, or computer assistance firms. Producer services have been a major source of growth in the national economy, but these services grow up around larger groups of core businesses in urban areas, not rural. The agglomeration of support firms is not available to local rural areas. Also, economic specialization, particularly in declining or stagnant employment sectors, makes rural areas vulnerable to change. The local economy has no other major industry to fall back on when demand for their specialty declines.

The occupational structure in producer services firms is heavily weighted by college educated, highly paid professional and technical workers. With these firms growing up around metro businesses, it skews the occupational distribution of jobs in metro areas toward the high end. Also, within industries, headquarters, administrative offices, and research and development shops are most often located in major metropolitan areas, adding to the metro advantage in high-education, high-pay jobs. Rural areas often are the sites of branch plants, where less skilled, less well paid operator, fabricator, and laborer jobs predominate.

Distributions of the employed by industry and occupation illustrate how these two facets of rural economies changed during the 1980's. The large metro areas maintained their advantage in the proportion employed in finance, insurance, real estate, and business and repair services industries (table 3). They also led in the proportion employed in transportation, communications, public utility, and wholesale trade industries. Combined, these two groups of industries employed 27 percent of workers in large metro areas in 1990 compared with 23 percent of workers in smaller metro areas. None of the groups of nonmetro counties could compete with metro areas in the proportion of workers in those industries. In professional service industries, the nonadjacent counties with moderate size cities matched the metro proportions in both 1980 and 1990, reinforcing the possibility that they contain more educational or health facilities than the other nonmetro groups.

Employment in the extractive industries (farming, mining, forestry, and fishing) declined during the 1980's. Along with the continuing decline in employment in agriculture, oil and coal production jobs also declined during the 1980's as the world glut of oil decreased demand for domestic production. The number of extractive jobs declined over the decade in all nonmetro county groups. The nonadjacent counties without cities were the most dependent upon extractive industries and experienced the largest decline, -17.3 percent. Many of those counties are dependent upon one of the extractive industries for a major proportion of employment, making the decline in those industries more stressful to their local economies.

The large metro advantage in quality of jobs can also be seen in occupational distributions. Executives and professionals accounted for 30 percent of large metro employment in 1990 compared with 26 percent of smaller metro area employment (table 4). Among the nonmetro county types, nonadjacent-with city counties had the highest proportion in these occupations (22 percent). On the other hand, precision production workers, machine operators, and transportation equipment operators accounted for much larger proportions of nonmetro than metro employment. Among the nonmetro county types, the nonadjacent-with city counties are the least concentrated in those occupations (26 percent). These occupational concentrations reinforce the impression given by the industrial distributions—executive and professional workers are concentrated in headquarters offices and producer services firms in metro areas while production workers are concentrated in nonmetro branch plants and locally-owned production facilities.

Income and Earnings

Per capita income and earnings per job data from the Bureau of Economic Analysis at the U.S. Department of Commerce show how the economic status of the various county groups changed over the 1980's. The per capita income amounts are based on the income of persons living in each area, and the earnings per job amounts apply to jobs located in each area.

With fewer working-age residents, lower educational attainment, and industrial and occupational structures skewed toward lower paid jobs, it is understandable that nonmetro areas did not close the income gap with metro areas over the decade. In fact, nonmetro areas lost economic ground during the 1980's. In 1979, per capita incomes in the four nonmetro county groups ranged from 78 percent (in the counties adjacent to large metro areas) down to 69 percent (in the nonadjacent-no city group) of large metro areas' per capita income (table 5). By 1989, those ratios ranged from 73 down to 64 percent. Even the smaller metro areas lost ground compared with the larger metro areas, falling from 85 to 82 percent of the larger metro areas' income over the decade.

Per capita income in the nonadjacent-with city group was slightly higher than the per capita income of the group adjacent to smaller metro areas. It appears that access to the opportunities in their own small centers may have been as beneficial as the access the other counties have to small metro areas' opportunities.

Average earnings per wage and salary job in nonmetro areas also declined compared with earnings of large metro area jobs. In 1979, nonmetro real earnings per wage and salary job

ranged from \$18,456 down to \$16,643 (in 1989 dollars), 79 to 71 percent of large metro earnings (\$23,314). While large metro areas' earnings more than kept up with inflation over the 1980's, growing to \$24,978 per job in 1989, nonmetro earnings did not keep up, declining to between \$18,097 and \$15,898 (73 to 64 percent of large metro areas' earnings).

Each type of nonmetro county experienced declining real earnings per job over the decade, with earnings in the nonadjacent groups falling the most. Earnings per job in adjacent nonmetro counties (particularly those adjacent to the larger metro areas) may have been supported by metro competition for workers or the spillover of higher-wage metro firms into those counties. The residents of the adjacent counties have the added benefit of access to the more highly paid jobs in metro areas.

Poverty

The poverty rate, the percent of people whose family income (or personal income if living alone) is below the poverty threshold for a family of their size and type, also indicates that the economic status of nonmetro areas fell further below that of metro areas during the 1980's. With earnings not having kept up with inflation and the poverty thresholds being reset annually to account for inflation, it is not surprising that the poverty rate increased in all types of nonmetro counties. Somewhat puzzling, however, is the large jump in poverty in the nonadjacent-with city group of counties, from 15.2 percent in 1979 to 17.3 percent in 1989 (table 6). This group of counties stands out in educational attainment and industrial and occupational distributions as the most promising of the nonmetro county types. Further study is needed to explain the larger increase in poverty in this group.

The poverty rate increased in all county groups, with the large metro areas experiencing the smallest increase. Perhaps many families are finding it difficult to obtain the right number and kind of jobs to provide for their basic needs. The rise in poverty may also indicate that inequality in the distribution of income among families increased. Families with more than one earner and those with well-paid jobs may have increasing incomes while those dependent on transfer payments and those with lower-paying jobs may not have kept up with inflation.

Implications for Rural Development Strategies

First, the various types of nonmetro areas must exploit their emerging advantages. The adjacent counties can explore ways to 'hitch a ride' on the economic advantages of the metro area. It appears that counties adjacent to the large metro areas may have already found ways to do that in the 1980's. Those adjacent to smaller metro areas may need to find new ways to draw some of the activities now centered in the metro area out to their counties.

The nonadjacent counties with a moderate size town may pursue development strategies that add to the core community, increasing the variety of goods and services produced and sold there and gaining some of the higher level professional services many businesses in small communities purchase from metro areas. The more remote counties, many of which are dependent upon the extractive industries of agriculture, mining, or forestry may increase sales of their services. Some agricultural areas may be able to develop local food processing

companies instead of shipping raw products to processors outside the area. An option for remote areas with amenities (e.g. scenic beauty or historically significant buildings/lands) may be more effective advertising campaigns aimed at retirees and/or tourists. And, those areas might find ways to capture more tourist dollars in things bought, not settling for just hotel, meal, and other service purchases by tourists. For example, some rural communities may have untapped reservoirs of craftspersons ready to make and sell unique items to tourists.

Second, local planners can facilitate inter-firm networking to overcome isolation, distance, and the absence of agglomeration economies. This should be possible, especially when local firms are not competing in the same market. Sharing information and possibly business services with noncompetitors would lower each firm's costs, making cooperation profitable. An example of how firms can cooperate comes from an article by Donald Dale Jackson in *Smithsonian* magazine about a small town in Wisconsin. Viroqua retailers were distressed to learn that a Wal-Mart discount store would be opening near their community, competing for their customers. Many adopted new sales strategies to get out of direct competition with Wal-Mart's lowest priced items, but many other stores closed. A local bed-and-breakfast owner took it upon herself to locate the "Downtown Coordinator for the State of Wisconsin" and convince him to speak to the town. He suggested that the town should compete in the Main Street program sponsored by the State and the Trust for Historic Preservation. The winner would receive three years of revitalization assistance through the advice of technical experts, but no money. The catch was that the winning town had to raise at least \$150,000 to pay for a project manager. Several business owners cooperated in developing the project proposal and presenting it to a review panel in the State capitol. When Viroqua won, the town government and nearly all downtown businesses donated to the \$150,000 fund. Although more businesses did close after the program began, other businesses renovated, new businesses opened, and the town invested in new street lights on main street. Parenthetically, Viroqua is a town of nearly 4,000 residents in Vernon county, adjacent to the small metro area of La Crosse, my home town. If a town that small can raise over \$150,000, cooperation like this may be feasible in many small communities. The activating ingredient is obviously the tenacity and vision of a few motivated entrepreneurs.

Third, rural areas can focus on improving connections to the national/global marketplace. Change in markets is much quicker than it once was, competition more quickly exploits opportunities, and the best entrepreneurial opportunities appear to be in niche markets. If rural areas focus on standardized products for mass markets, they run the risk of stiff national and international competition which puts downward pressure on prices, wages, and entrepreneurial returns in those sectors.

Telecommunications is one way rural areas can increase their connections. Two articles in the forthcoming issue of *Rural Development Perspectives* list the benefits and drawbacks of telecommunications as a development strategy and present the results of a small survey of telecommunications-based firms in North Dakota. Telecommunications may be a double-edged sword for rural areas. They can increase rural areas' access to information and become a source of telecommunications-based rural jobs, but they can also make it easier for international firms to compete for those jobs. Telecommunications-based firms in North Dakota generally provide part-time shiftwork, but they have wages and benefits comparable

to those of new manufacturing firms in the State. This finding runs counter to the stereotype of telecommunications jobs as less desirable than manufacturing jobs, but it also raises the question whether new manufacturing jobs are paying what manufacturing jobs used to pay.

Transportation improvements also increase connections. Commercial airline and airfreight are of special importance in decreasing time to market for rural products. Improved roads and bridges make it easier for tourists to visit and for local goods and services providers to serve the surrounding countryside.

Lastly, attitudinal adjustment may be needed in some rural areas to create the cooperation necessary for successful development strategies. A quote from one Viroqua businessman, "The real payoff was neither celebrity nor profit but, rather, the confidence and cohesion Viroqua discovered within itself," (Johnson, p. 46) illustrates how development plans can change the outlook of rural communities. Success of rural development efforts is generally measured by new residents, jobs, or income added to the rural area. But, perhaps of equal or greater importance is the positive community attitudes these activities can create. Along with the entrepreneurial spark to get things rolling, these subjective factors somehow need to be integrated into measurement of rural development.

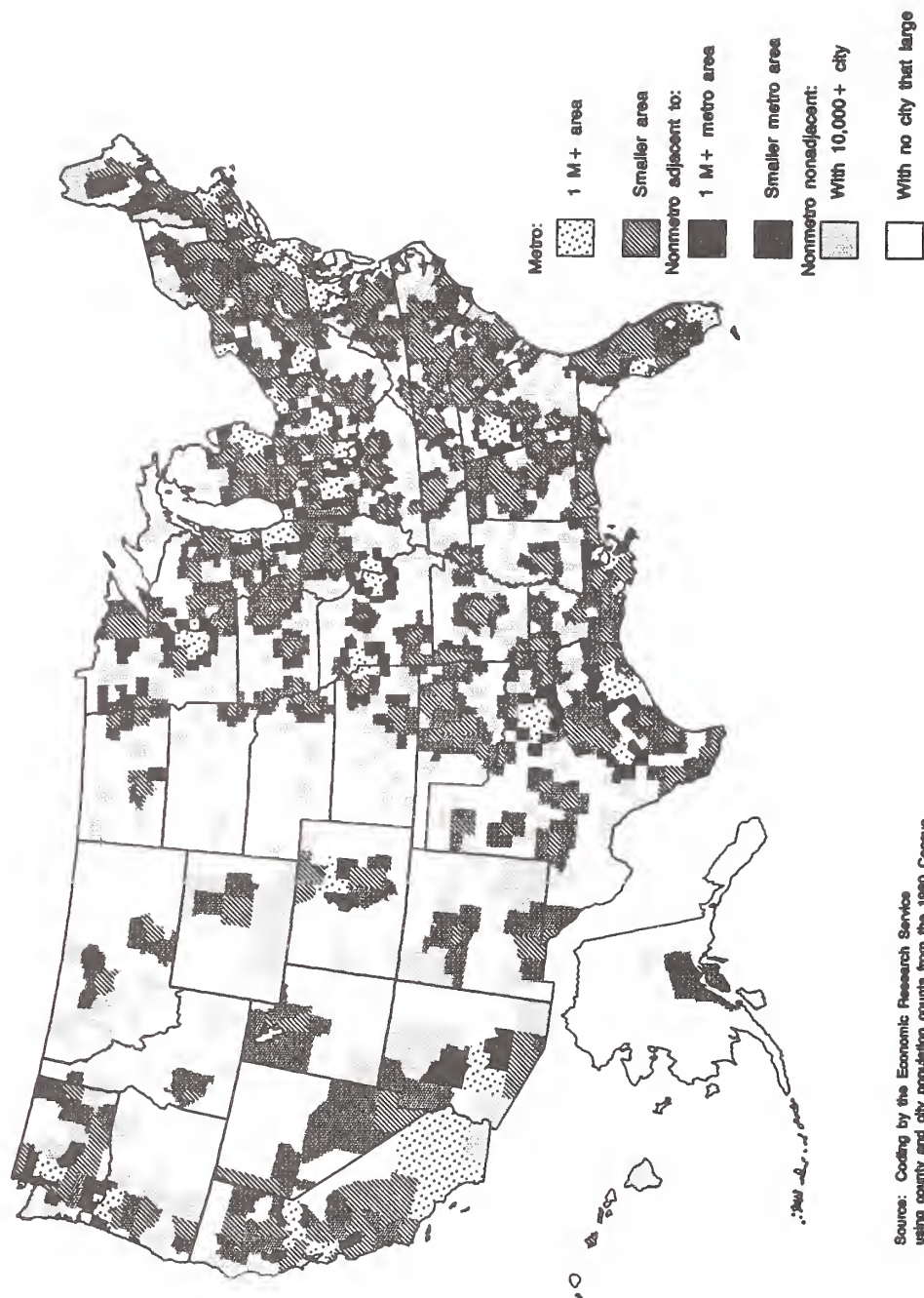
In Closing, More to Come

A special issue of one of ERS's rural development-related journals, **Rural Conditions and Trends**, will include a broader range of information on the county types I discussed today. The special issue will also categorize nonmetro counties by various economic and social characteristics and by region. We are currently drafting that report and hope to publish by March.

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Figure 1--Counties by Metro Status, Adjacency, and City Size, 1980



Sources: Coding by the Economic Research Service using county and city population counts from the 1980 Census.

Table 1--Population change and age distribution in nonmetro counties by adjacency and city size, 1980-90

	Metro counties		Nonmetro counties			
	in area of 1 million +	in smaller area	Adjacent to metro area of 1 million +	Adjacent to a smaller metro area	Not adjacent, has city of 10,000 +	Not adjacent, has no city that large
Population (in millions)						
1980	101.4	70.8	5.9	20.9	12.7	14.9
1990	113.4	78.6	6.5	22.1	13.3	14.8
Percent change 1980-90	11.9	11.1	10.5	5.7	4.3	-0.6
Age distribution (in percentages)						
1980						
Under 18	27.3	28.4	28.8	29.5	29.2	29.9
18-64	62.0	60.9	58.2	57.5	59.1	55.9
65 +	10.7	10.7	13.1	13.0	11.7	14.2
1990						
Under 18	24.9	25.7	26.1	26.5	26.9	27.1
18-64	63.5	61.9	59.3	58.8	59.8	56.9
65 +	11.6	12.4	14.6	14.7	13.4	16.0
Percent change in number of people in age group, 1980-90						
Under 18	2.0	0.8	-0.0	-5.2	-4.0	-9.7
18-64	14.6	12.9	12.7	8.2	5.4	1.2
65 +	21.2	28.6	23.7	19.5	19.0	11.4

Source: 1980 and 1990 Censuses of Population.

Table 2--Educational attainment in nonmetro counties by adjacency and city size, 1980-90

	Metro counties		Nonmetro counties			
	in area of 1 million +	in smaller area	Adjacent to metro area of 1 million +	Adjacent to a smaller metro area	Not adjacent, has city of 10,000 +	Not adjacent, has no city that large
<i>Percent</i>						
Completed 4 years of high school, population 25+						
1980	70.1	67.1	61.6	58.0	62.2	55.5
1990 ¹	77.6	76.2	72.1	69.0	71.7	66.1
Completed 4 years of college, population 25+						
1980	19.1	16.0	11.2	10.5	13.3	9.6
1990 ²	24.4	19.7	13.4	12.6	15.6	11.2

¹This is the percentage having received at least a high school diploma or GED certificate.²This is the percentage having received at least a bachelor's degree.

Note: No adjustment is possible for the differences between the 1980 and 1990 educational attainment definitions.

Source: 1980 and 1990 Censuses of Population.

Table 3--Employment by industry in nonmetro counties by adjacency and city size, 1980-90

	Metro counties		Adjacent to metro area of 1 million +	Nonmetro counties		
	in area of 1 million +	in smaller area		Adjacent to a smaller metro area	Not adjacent, has city of 10,000 +	Not adjacent, has no city that large
Thousands employed in 1980	45,781.8	30,476.4	2,341.6	8,271.9	5,149.7	5,618.0
Percent distribution by industry:						
Extractive	1.5	3.3	8.0	9.2	8.2	15.6
Manufacturing	21.7	22.8	26.0	27.0	20.1	20.6
Transp./Comm./Pub. Util./Whole.	12.7	11.2	10.0	9.3	10.6	9.6
Retail trade	16.0	16.6	15.6	14.7	17.2	15.0
Finance/Ins./Real Est./Bus. Serv.	12.6	9.4	6.5	6.2	7.1	5.6
Professional services	20.5	20.9	18.8	18.5	21.0	18.0
Other	15.0	15.8	15.1	15.1	15.8	15.7
Thousands employed in 1990	55,166.7	36,506.4	2,806.1	9,483.0	5,697.9	6,021.0
Percent distribution by industry:						
Extractive	1.6	2.9	5.9	7.1	6.3	12.0
Manufacturing	16.3	17.7	21.1	23.5	17.9	19.6
Transp./Comm./Pub. Util./Whole.	12.6	11.0	10.2	9.2	9.8	9.3
Retail trade	16.2	17.7	12.6	16.2	18.7	16.2
Finance/Ins./Real Est./Bus. Serv.	14.2	10.8	8.2	7.4	7.8	6.6
Professional services	23.7	23.9	21.3	21.0	23.9	20.7
Other	15.4	15.9	16.2	15.5	15.6	15.6

Source: 1980 and 1990 Censuses of Population.

Table 4--Employment by occupation in nonmetro counties by adjacency and city size, 1980-90

	Metro counties		Adjacent to metro area of 1 million +	Nonmetro counties		
	in area of 1 million +	in smaller area		Adjacent to a smaller metro area	Not adjacent, has city of 10,000 +	Not adjacent, has no city that large
Thousands employed in 1980	45,781.8	30,476.4	2,341.6	8,271.9	5,149.7	5,618.0
Percent distribution by occupation:						
Executive/Professional	25.3	22.3	17.9	17.1	19.8	16.6
Technical/Sales	13.8	13.4	11.0	10.4	12.4	9.9
Admin. support/Clerical	19.7	16.8	13.2	12.7	14.0	11.3
Service	12.5	13.3	13.4	12.9	14.0	13.3
Farming/Forestry/Fishing	1.1	2.3	5.8	7.1	5.5	11.3
Prec. prod./Mach. op./Trans. op.	23.6	27.4	33.2	34.2	29.1	32.0
Handler/Equip. cleaner/Laborer	4.0	4.5	5.5	5.6	5.1	5.6
Thousands employed in 1990	55,166.7	36,506.4	2,806.1	9,483.0	5,697.9	6,021.0
Percent distribution by occupation:						
Executive/Professional	29.7	25.7	20.4	19.4	22.1	18.2
Technical/Sales	16.3	16.0	13.3	12.6	14.5	11.7
Admin. support/Clerical	17.8	16.1	13.6	13.1	13.5	12.0
Service	12.5	13.6	14.2	13.7	15.0	14.4
Farming/Forestry/Fishing	1.1	2.1	4.5	5.6	4.5	8.9
Prec. prod./Mach. op./Trans. op.	19.1	22.5	29.0	30.6	25.6	29.8
Handler/Equip. cleaner/Laborer	3.5	4.0	5.1	5.1	4.7	5.2

Source: 1980 and 1990 Censuses of Population.

Table 5--Per capita income and earnings per job in nonmetro counties by adjacency and city size, 1979-89

	Metro counties		Nonmetro counties			
	in area of 1 million +	in smaller area	Adjacent to metro area of 1 million +	Adjacent to a smaller metro area	Not adjacent, has city of 10,000 +	Not adjacent, has no city that large
Real per capita income by place of residence						
1979 (in 1989 dollars)	16,949	14,327	13,237	12,183	12,575	11,724
1989	20,432	16,721	14,920	13,817	13,951	13,093
Percent change, 1979-89	20.6	16.7	12.7	13.4	10.9	11.7
Percentage of large metro income						
1979	100.0	84.5	78.1	71.9	74.1	69.2
1989	100.0	81.8	73.0	67.6	68.3	64.1
Real earnings per wage and salary job, by place of work						
1979 (in 1989 dollars)	23,314	20,364	18,456	17,428	18,211	16,643
1989	24,978	20,565	18,097	17,196	17,509	15,898
Percent change, 1979-89	7.1	1.0	-1.9	-1.3	-3.9	-4.5
Percentage of large metro earnings						
1979	100.0	87.3	79.2	74.8	78.1	71.4
1989	100.0	82.3	72.5	68.8	70.1	63.6

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Local Area Personal Income and Employment Estimates, June 1992.

Table 6--Poverty in nonmetro counties by adjacency and city size, 1979-89

	Metro counties		Nonmetro counties			
	in area of 1 million +	in smaller area	Adjacent to metro area of 1 million +	Adjacent to a smaller metro area	Not adjacent, has city of 10,000 +	Not adjacent, has no city that large
Percent of persons below the poverty level						
1979	11.0	11.9	11.9	15.1	15.2	18.4
1989	11.5	12.9	13.2	15.8	17.3	19.4

Source: 1980 and 1990 Censuses of Population.

Outlook '92

For Release: Wednesday, December 16, 1992

PROSPECTS FOR RURAL PROSPERITY IN THE 1990s

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After a traumatic decade of adjustment, rural America is wondering if the 1990s promise more prosperity. There are reasons for an optimistic view of the future: agriculture has undergone a strong financial turnaround; tourism and retirement continue to fuel growth in scenic parts of the country; and manufacturing has continued a relentless drive for increased productivity. But alongside these positive factors, nagging concerns linger about the pattern of growth across rural America. The gap between rural winners and losers appears to be widening. In fact, parts of rural America remain in serious decline.

What are the prospects for rural prosperity in the decade ahead? The answer requires more than the usual amount of care simply because discussing rural America in total provides much less insight than in the past. Most rural counties in southwestern Missouri, for example, appear to be on a path to solid economic growth, mainly because they have scenic amenities, a pleasant climate, and easy access to a new country music mecca in Branson. Most rural counties in northwestern Missouri, meanwhile, face a tougher future. Agriculture no longer provides a basis for general rural growth as it did for the past two centuries in that farm-dependent area. These are but two contrasts found in the intricate socioeconomic fabric that we call rural America.

There are three useful steps to understanding rural America's prospects for prosperity in the 1990s. The first is to draw some lessons from the rural economy's growth pattern in the 1980s. The second is to recognize a few special factors that appear to be shaping rural growth. The third is to put these lessons and factors in perspective by considering a brief case study of rural counties that have done exceptionally well in the heartland. Finally, some conclusions can be drawn about what to expect in the 1990s.

THE RURAL GROWTH PATTERN OF THE 1980s

The rural economy underwent a fundamental change in the 1980s, a change defined by three facts. First, rural growth slowed sharply in all regions of the country, compared with both the rural path of the 1970s and metropolitan growth in the 1980s. Second, proximity to metro areas was critical for those rural areas that maintained steady growth in the 1980s. And third,

traditional rural economic bases did quite poorly in the 1980s.

Rural Growth Slowdown

One way to gauge rural economic change in the 1980s is to compare rural and metro growth rates within a given region and then gain a broader perspective by comparing these rates with those in other regions. Such comparisons suggest that rural areas did well in a couple regions--New England, in particular--but in general rural growth migrated to metro places. Figure 1 shows the eight Commerce Department regions that are used in dividing up the nation's rural and metro counties.

Rural income growth lagged well behind metro areas in the 1980s. The divergence stands out in stark relief when the ratio of rural income growth to metro income growth is computed (Chart 1). For the United States as a whole, rural incomes grew only 60 cents for every \$1.00 of metro income growth. In New England, the only region where rural incomes grew faster than metro incomes, a dollar of new income in Boston was matched by \$1.08 in rural New Hampshire. Meanwhile, in the Plains, a dollar of new income in Kansas City was matched by just 20 cents in rural Kansas. As the Chart indicates, rural income growth outpaced metro growth in six of the nation's eight regions.

The Value of Proximity to Metro Areas

Rural is a term often defined in terms of not being urban. The difficulty comes in deciphering how far economic influence extends from a metro area. Beale codes, developed by USDA demographer Calvin Beale, address this spatial conundrum. Beale codes define a spectrum of ten county categories, ranging from urban core to absolutely rural.

Arraying economic growth by Beale codes provides one of the most striking pictures of the rural economy in the 1980s (Chart 2). Rural growth declines in straight-line fashion as distance from a metro area increases. The conclusion holds for both employment growth (shown in Chart 2) and income growth. By contrast, rural growth shows a much flatter pattern in the 1970s.

Thus, one of the profound features of the new rural economy is that spatial links are fundamental to rural success. While many individual rural communities are exceptions, the general rule is that economic activity is migrating steadily to metropolitan areas, which appear to be the real engines of our economy. The record shows that living next to a metro area counted for much in the 1980s in determining a rural place's prosperity.

Rural Growth by Economic Base

Another important change to the rural economy in the 1980s was a wider range of performance across different types of economic base. Chart 3 shows the growth in employment for eight different rural economic bases (a similar chart for growth in real income would reveal nearly the same pattern). The rural county categories are based on those developed by the Economic Research Service which sort counties by economic base.¹ The categories have been

modified to make each county type mutually exclusive of the others. The performance data do not measure the performance of the different industries themselves. Rather, they indicate the performance of rural places dependent on such industries.

Retirement and mixed counties were the only rural economic bases that did well in the 1980s. Rural retirement counties were the only ones that outperformed metro areas in income and employment growth for the decade. The so-called mixed counties, which have a diverse economic base, also did better than most other county groups.

Both retirement and mixed counties can be viewed as emerging trade centers in rural America, places that are insulated to some degree from international market pressures. In the past decade, retirement counties thrived on transfer payments and a proliferation of services. In fact, both county types were able to tap into the surge of service jobs in the nation. Retirement counties benefitted from a growth in health care and financial services. Mixed counties, by becoming hubs for rural trade, experienced growth in a wide range of services.

Meanwhile, rural counties dependent on industries that compete in global markets ranked last in economic performance. Farm-dependent and mining-dependent counties lost jobs throughout the decade. Agriculture and energy clearly underwent dramatic change in the 1980s due to the pressures of global competition. Manufacturing-dependent counties--more than a quarter of the total rural population--also did poorly, but their modest growth was somewhat better than the two county types dependent on natural resources.

Decade-long averages may overlook a possible rural recovery in recent years. Farm-dependent counties, for example, have been buoyed by the farm recovery. Yet annual data since 1987 suggest that even record farm incomes did not lead to a widespread rebound in economic activity in those counties. Anecdotal evidence from our seven-state 10th Federal Reserve District, for example, suggests that structural change in agriculture has led to fewer farms, fewer agribusinesses, and a weaker economic multiplier in farm communities. Economic activity appears to be migrating to farm trade centers that are prospering at the expense of surrounding communities.

Summary

The rural economic transition is uneven across regions but, in general, rural places are lagging further behind as economic activity migrates to metro areas. Proximity to metro areas was highly significant in explaining the rural growth pattern in the 1980s, and there is no evidence that will change in the 1990s. Traditional rural economic bases were hurt badly in the 1980s, while retirement and rural trade center counties--the only county types that tapped into service growth--moved into the rural vanguard in the 1980s.

SPECIAL RURAL GROWTH FACTORS IN THE 1980s

After suffering in the 1980s, has the rural economy done better in the

1990s? Unfortunately, 1990 is the last year for which county-level data are available to shed light on that question. Employment and income data for 1990 point to a slowing in both employment and income growth for both rural and urban America, a development that should not be surprising since the recession started that year (Chart 4). A closer look at the data suggests that rural places in nearly all regions of the country generally gained ground on urban growth in incomes and jobs.

With a paucity of hard information on rural growth trends in the 1990s, a more useful approach may to identify ongoing factors that seem to be shaping growth in the rural economy. In light of the trends that defined the 1980s, and in light of the scattered nature of rural growth, what are the special factors that seem likely to influence rural growth in the 1990s? Four factors appear especially important: agglomeration, amenities, industry mix, and proximity to metropolitan areas.

Agglomeration

Agglomeration describes the benefits that come from having a core concentration of businesses. Companies gain from such a concentration by being able to network with other companies in the same industry. Examples of agglomeration include high-technology firms in Silicon Valley and insurance firms in Des Moines. Because rural communities typically have small-scale economies, they lack the same critical mass that provides agglomeration benefits in suburban or urban places. Agglomeration appears to be particularly important in explaining growth in the service industry.

The rural economy's failure to participate in the nation's rapid growth in services is one big reason that it lagged behind metropolitan areas in the 1980s. Data through the middle of the decade revealed that seven of eight new service sector jobs were created in metro areas, while only three of four people lived there. When employment growth in services in counties is arrayed by Beale codes for the entire decade, service activity again declines in step-fashion as you move away from metro areas. And not only did rural America lose out on service jobs, the jobs it did gain were low-pay service jobs. According to wage breakouts by Beale code county types, real wages grew 1.5 percent a year in metro areas throughout the 1980s, while they fell in completely rural counties.

While there are obvious exceptions, much of rural America fails to attract or nurture service companies, especially producer services. Producer services are services marketed to individuals or companies beyond the local area and include business services and financial services. Why has service growth by-passed rural areas?

There appear to be two contributing factors. First, there is no substitute for face-to-face interaction in marketing services. Trust is hard to establish long-distance. Second, service companies seek locations where there is already a strong base of service companies, locations that are generally close to a major market. There are exceptions; Cabela's, a sporting-goods retailer in Sydney, Nebraska, is an oft-cited example. But overall, the gains in service jobs in suburban and urban areas swamps those in

isolated cases. From a marketing and labor viewpoint, service companies derive the most benefits where agglomeration benefits can be found. There are real questions about how rural America can tap into the new service-based economy.

Amenities

Scenic amenities--such as mountains or lakes--are a critical factor that can quickly sort rural America into winners and losers. Rural America has always been a scenic destination to some degree, but now some rural communities are making conscious effort to market themselves for their scenic value. A scenic amenity, it turns out, is one of the best assets upon which to build a rural economy. Colorado's rural counties nestled along the Front Range or in the mountains offer obvious recreational opportunities. Building on those opportunities, those rural counties saw their employment grow 2.3 percent a year in the 1980s. By contrast, job growth averaged just 0.5 percent a year in the state's eastern rural counties located in the plains. In the 1990s, rural counties with amenities appear to have a natural economic advantage.

Industry Mix

Industry mix will be an important growth determinant in the 1990s, just as it has in the past. Profound changes in manufacturing, agriculture, and energy--three traditional rural economic bases--point to an ongoing transition for rural counties that still depend on them.

Manufacturing has undergone a relentless pursuit for productivity. Faced with stiff competition abroad, U.S. manufacturers have overhauled how they do business. They have moved from inflexible large-batch processing to flexible manufacturing. They have outsourced inputs previously produced internally. And they have invested in new technologies and processes while slashing labor rolls. Many of these changes were prompted by the need of makers to respond quickly to changing final demand markets. As these changes begin to be understood, there is some evidence that these manufacturing innovations may favor metro areas over rural places. More research is needed before strong conclusions can be reached, but locating manufacturing in rural areas may be less attractive than it once was.

Agriculture has undergone a profound change of its own. The farm financial crisis of the mid-1980s brought an acceleration in farm and agribusiness consolidation. In fact, the industry played catch-up, offsetting the 1970s when consolidation slowed. The reality is that agricultural production now requires less rural infrastructure to support it, just as the 1960s required less than the 1930s. Put simply, there are fewer farms, fewer lenders, fewer suppliers, fewer buyers of farm products. The result is a consolidation of economic activity in farm-dependent rural places--only the strong communities survive.

As in agriculture, the energy industry seems likely to fuel rural economic activity in a much more focused way than in the past. In the 1970s,

the energy industry was a strong source of rural growth, but in the 1980s disaster struck. The industry has downsized, forcing severe cost-cutting and a new search for productivity. The industry can now sink oil wells and mine coal with far fewer workers than before. The Wyoming coal industry, for instance, has seen steady growth in coal output, but has actually seen employment fall. That has had adverse affects on some rural Wyoming communities. In short, improvements in the energy industry will bring only muted gains for rural communities.

Proximity to Metropolitan Areas

Remoteness is the essence of being rural, but will remoteness be an asset or liability to the rural economy in the 1990s? The record of the 1980s shows that, in general, economic activity migrated from rural to urban places. Will that continue?

There are three reasons to believe that remoteness will be a liability. First, rural places are removed from markets. Consumer expectations are becoming more specific and they are changing more quickly. Firms that change products to meet consumer expectations are rewarded, firms that do not shift quickly are punished. Firms in metropolitan areas are closer to their customers and may be more nimble in responding to changing consumers. Second, rural places are removed from centers of information, technology, and innovation. Silicon Valley sprung up where it did because it was close to several universities with world class technological innovations. Few rural places lay claim to being centers of technological innovation. Third, rural places are removed from social and cultural amenities now deemed critical by many in our society. Many believe that such amenities cannot be duplicated through such long-distance means as satellite television.

Remoteness can also be a growth virtue. Our nation increasingly recognizes the problems found in our major cities--crime, pollution, congestion. And such problems are encouraging a migration out of places like southern California. Some rural areas will benefit from this emigration, the central valley of California is probably one such place. But the pattern of the 1980s suggests that migration may be mainly toward rural places with scenic amenities or other location virtues.

Taken together, what do these rural growth factors suggest about the 1990s? First, they suggest a rural economy that will likely continue to trail the rest of the nation. Second, they suggest that growth will continue to migrate toward metropolitan areas, or rural areas adjacent to them. Third, they suggest that rural counties with traditional economic bases of farming, manufacturing, and energy face continued consolidation; that is, prosperity in trade center communities, but decline in surrounding communities. And finally, they suggest that--absent a scenic amenity--remoteness is a liability that completely rural communities must address.

RURAL WINNERS IN THE HEARTLAND

A useful way to illustrate the collective impact of the above factors is

to examine closely those rural counties that did well throughout the past decade. These "winners" provide clear insights into what it may take for rural communities to prosper in the 1990s. To make the analysis manageable, I am going to draw on some research at the Bank that looks at rural counties that did better than average in the Heartland.² I will define Heartland as the seven states in the Tenth Federal Reserve District: Missouri, Kansas, Nebraska, Oklahoma, Colorado, Wyoming, and New Mexico. The analysis divides rural counties into "winners" and "losers." Winners are counties where employment and income growth exceeded average employment and income growth for all nonmetro counties in the seven-state region.

About a quarter of the rural counties in the Heartland had better than average economic growth in the 1980s. For the decade as a whole, 119 of the 452 nonmetro counties had annual employment growth greater than the regionwide average of 0.8 percent. They also had income growth greater than the regionwide average of 0.8 percent. In fact, the rural winners that met that test outperformed the Heartland's metro areas, on average. Employment growth, for example, averaged 2.3 percent a year through the 1980s for rural winner counties, compared with 2.0 percent in the metro areas.

Who were the winners? Based on a breakout according to economic base, four of ten were either rural trade centers or had diverse economic bases. These communities often stole their growth from surrounding counties. Two of ten were retirement based counties, often with scenic amenities that helped draw retirees. One of ten had significant government installations that provided a steady source of growth. The remaining counties had mixed characteristics.

Equally revealing is an analysis of the rural counties that made up the loser category. Of 228 counties with subpar employment and income growth, four of ten were farm-dependent. Three of ten were trade counties, suggesting that a lot of rural retail activity was consolidated in the 1980s.

Based on Beale code classifications, a third of the counties were directly adjacent to a metropolitan area. Still, a quarter were completely rural with no urban center. While that suggests that completely rural counties can prosper, it appears to come mainly at the expense of other rural counties. Nearly half of the rural loser counties were completely rural.

The Heartland's rural growth pattern of the 1980s is best summed up by a map (Figure 2). When only the winning rural counties are shown, three general observations can be made. First, the Ozarks region of Missouri did well, largely because it has built on scenic amenities to attract tourism and retirees. Similar explanations appear to be at work in eastern Oklahoma. Second, the Rocky Mountain region did well, from northern Colorado south to Mexico. Tourism and recreation is awfully important here, although a mix of other positive factors enter in. Third, there is clear absence of rural winners throughout the farm-dependent Plains states of Nebraska, Kansas, and most of Oklahoma. Here rural winners stole their growth from neighboring counties as the consolidation of rural economic activity matched the consolidation occurring in agriculture.

CONCLUSIONS

What are the prospects for rural prosperity in the 1990s? A review of the 1980s suggests that rural growth probably will remain uneven. Counties that can tap into the service sector will do well, while growth in more traditional economic bases will consolidate into growth centers. An examination of special factors at work in the rural economy suggests that agglomeration, scenic amenities, industry mix, and proximity are key in deciding which rural communities grow and which do not. Finally, a case study of high performance rural counties in the Heartland shows that prosperity comes easily to rural places with scenic amenities or proximity to metro areas. It comes with much greater difficulty to isolated rural places that lack strong ties to metro areas or to new growth segments of the economy. Some completely rural counties do prosper, but usually at the expense of neighboring counties.

Overall, rural prosperity seems likely to come to individual rural communities and not in general. Even farm and energy booms, however unlikely, would not lift all rural counties. Too much has changed in the structure of the industries upon which rural people have so long depended. Those industries may grow, but the money is concentrated in fewer hands.

Rural policymakers face a future, then, where some rural places will prosper, but the gap between winners and losers will be wide. How might policymakers prepare for such a future?

First, acknowledge that there is no surefire path to rural prosperity. Rural counties with the best chance of prosperity probably have mountains or lakes or some other magnet amenity. But beyond drawing tourists and retirees, much of the rest of rural America is struggling with complex economic forces. Highways, fiber optic lines, health care--all are important but none is sufficient by itself to assure rural prosperity.

Second, steps need to be taken to remedy rural remoteness. Throughout history, our nation has valued equal access for rural Americans. The postal system and rural electrification are but two examples. Today, rural citizens have mail service but they are removed from centers of innovation and culture. While that has always been true, the rural disadvantage today appears bigger despite our mobile society and its world-class communications system. To prosper, rural businesses need an extension service aimed at a host of industries, not just agriculture; and they need a quality workforce that receives the social and cultural amenities they have come to expect. Is there a way to ensure access while at the same time allowing market forces to still operate? That is a thorny dilemma for public policy.

Third, rural places need options for achieving some agglomeration. Johnson County, Kansas--an affluent suburban county in the Kansas City metropolitan area--is successful because it has all the cultural amenities and the business networking that any service business could want. It will be impossible for rural counties in western Kansas to replicate that. But is it possible for rural communities to band together in innovative ways to produce

some agglomeration, even if only on a small scale? Regional airports, shared public services, and regional community colleges are three possible examples.

Fourth, research is needed on new technologies that can keep rural industries, like agriculture and manufacturing, world class while at the same time stimulating the broader rural economy. For more than 125 years, the public has made big investments in research at land grant universities, an investment that has paid a steady stream of dividends in increased productivity. There may be value in asking whether future research should focus strictly on productivity, or whether the impact on rural economic activity is also important. With citizens growing more concerned about the social problems that now plague some cities, and with growing concern for responsible stewardship of the rural environment, there may be a place for research that makes rural industries more competitive while also providing greater economic impact for rural communities.

ENDNOTES

1. Bender, Lloyd, and others. 1985. "The Diverse Social and Economic Structure of Nonmetropolitan America," in *Rural Development Research Report* 49. Washington: Economic Research Service, U.S. Department of Agriculture, September.
2. See Tim R. Smith, "Long-Term Growth in Rural Places: Winners and Losers in the 1980s," paper presented to the North American Meetings of the Regional Science Association International, Chicago, November 14, 1992.

Chart 1

Rural-Urban Income Ratio

Ratio: Rural Growth/Urban Growth

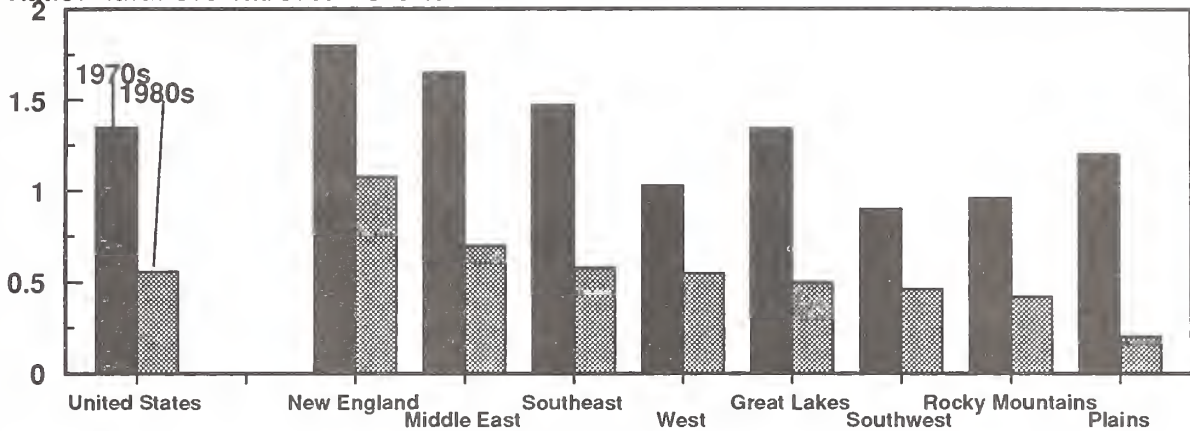


Chart 2

Employment Growth by Beale Code

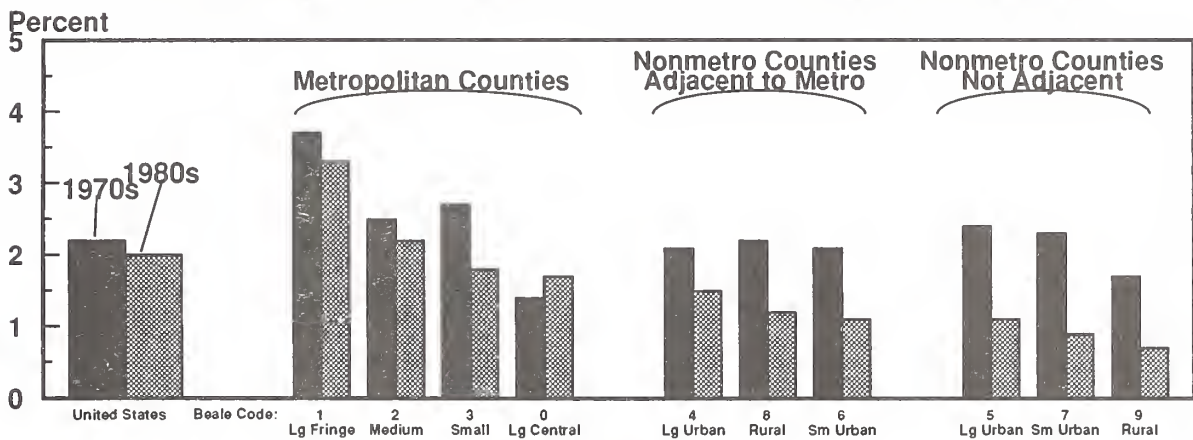


Chart 3

Employment Growth by County Type

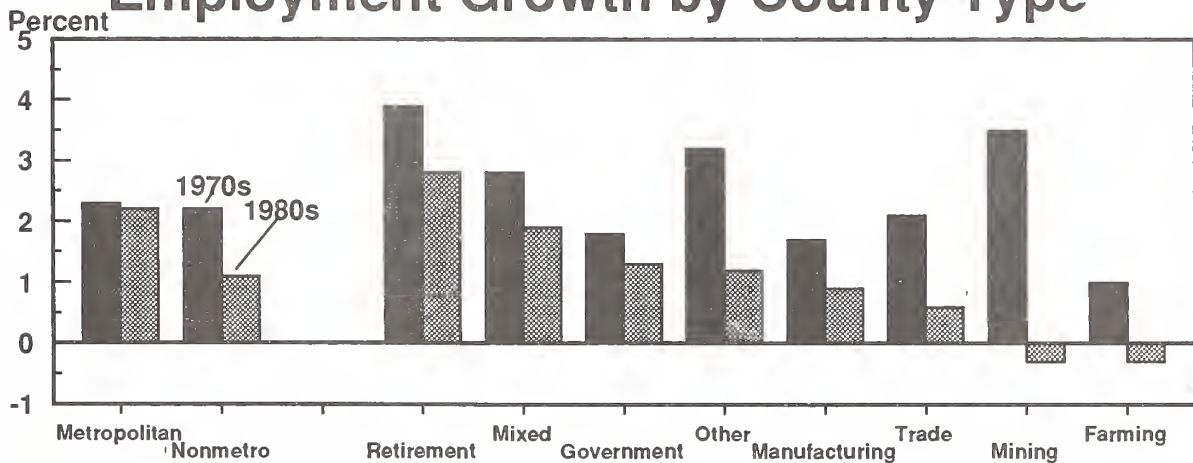


Chart 4

Employment Growth, United States

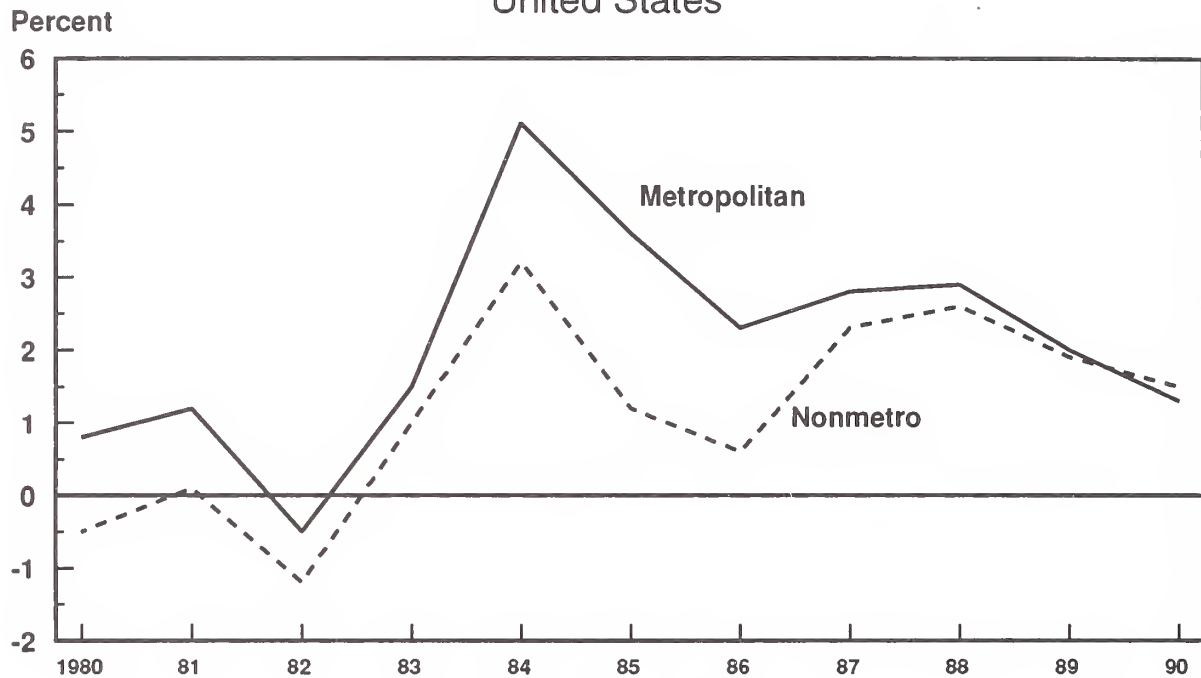


Figure 1
U.S. Economic Regions

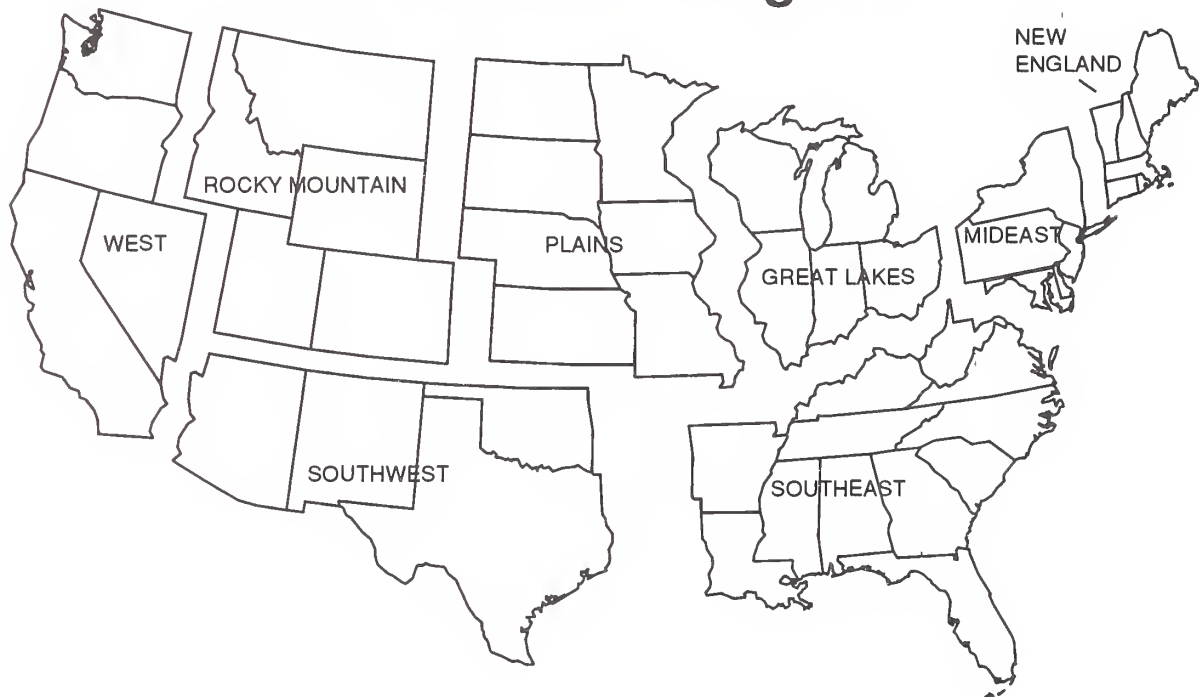
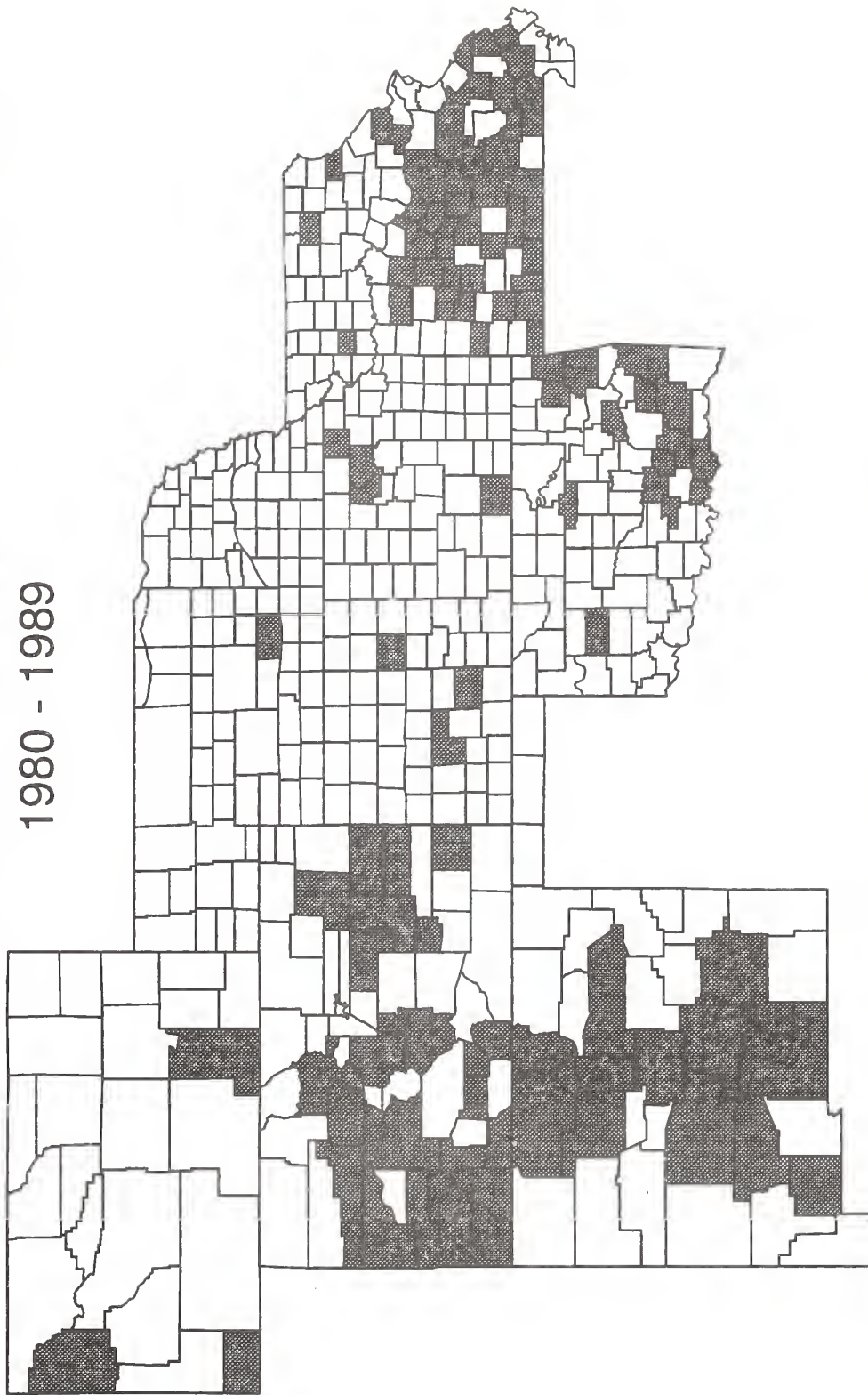


Figure 2
Heartland Nonmetro "Winner" Counties *
 1980 - 1989



* Rural counties with average annual growth in employment and income greater than the rural average for the seven-state region.

Outlook '93

For Release: Thursday, December 3, 1992

THE RURAL ECONOMY IN THE 1990'S: THE ROLE OF MANUFACTURING.

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The relatively poor performance of rural economies during the 1980's is well-documented. The rural turnaround of the 1970's was decisively ended with back-to-back recessions in 1980 and 1982. The subsequent recovery, while one of the longest in postwar history, was hardly robust. Rural America was particularly slow to recover, as job and income growth both remained low, unemployment rates remained relatively high, and the gap between rural and urban per capita income widened for the first time in decades.

Unfortunately, the 1990's also began unpropitiously with the economy entering a recession just seven months into the new decade. For many rural economies, whether the relatively slow growth of the first part of the 1990's means that the rest of the decade will resemble the 1980's or whether economic conditions in rural areas will turn around significantly will depend to a large degree on what happens to manufacturing. Because of its increasing importance of in rural economies, my talk will focus on manufacturing. First, I will talk about how manufacturing employment has shifted away from more urban areas. The fact that many nonmetro counties gained manufacturing jobs even though there were very large losses for the U.S. as a whole is one of the few bright spots in the performance of rural economies during the last decade. I will then show that productivity in rural manufacturing lagged urban productivity during the 1980's and discuss some of the implications of this productivity gap. Finally, I will discuss some of the long-term changes occurring within manufacturing that are likely to play important roles in the coming years.

Goods-producing Industries More Important for Rural Economies

Despite an ever-increasing share of employment in service producing industries, rural economies are much more dependent on goods-producing industries (agriculture, mining, and manufacturing) than are urban economies. Rural goods-producing industries accounted for 37.7 percent of employment in 1969, declining to 27.7 percent by 1990. In contrast, goods-producing industries accounted for only 26.2% of urban jobs in 1969, falling to 16% by 1990 (Table 1).

At the same time, manufacturing has become a much more important part of goods-producing industry within rural areas. Traditionally, rural economies have been thought of as predominantly resource dependent economies. However, even in the most rural counties, manufacturing is superseding agriculture and mining as the primary economic base. For instance, in 1969, 51.2 percent of goods-producing employment in the less-urbanized counties (nonmetro counties with an urban population of 20,000 or less) was in manufacturing industries and 28.7 percent for the completely rural counties (counties with no urban population) (Table 2). By 1990, manufacturing's share had risen to 61 percent of goods-producing employment in the less-urbanized counties and 41.5 percent in the completely rural counties. The much lower dependence on agriculture and mining in the urbanized nonmetro counties (counties with an urban population exceeding 20,000) is reflected by manufacturing's relatively high and stable share of goods-producing employment in these counties.

It should be pointed out that the rising importance of manufacturing does not mean that farming and other resource-based activities are no longer important. For many counties these industries are still the most important industries and are likely to remain dominant. Furthermore, many manufacturing industries are highly dependent on local or regional supplies of agricultural and resource-based inputs. Nevertheless, the increasing share of manufacturing employment, even if tied closely to more traditional rural industries, changes the dynamics of the local economy and therefore affects the types of policies that are likely to be most effective in addressing rural problems.

Manufacturing Shifts Away from Urban Areas.

The increased importance of manufacturing in both the less-urbanized and completely rural counties reflects that fact that almost all the job growth in U.S. manufacturing during both the 1970's and the 1980's occurred in these two county types. During the 1970's, manufacturing employment grew in all types of counties but far more jobs - nearly 500,000 - were added in the less-urbanized counties than in any of the other county groups (table 3). In fact, 49 percent of all manufacturing job growth in the U.S. occurred in the less-urbanized nonmetro counties.

Looking now at the 1980's, there was an overall loss of manufacturing jobs in the U.S. between 1979 and 1990 but this was almost entirely due to huge losses in metro counties. Metro counties lost 1.8 million manufacturing jobs during the 1980's, with urbanized nonmetro counties losing an additional 108,000. Over the same period the less-urbanized and completely rural counties gained nearly 120,000 jobs.

In terms of growth rates, metro manufacturing grew less than two percent during the 1970's and fell over 10 percent during the 1980's (table 4). Likewise, job growth turned negative during the 1980's for urbanized nonmetro counties. In contrast, manufacturing job growth was positive in both decades for the less-urbanized and completely rural counties. During the 1970's, manufacturing employment grew by 23 percent in less-urbanized nonmetro

counties and by 29 percent in completely rural counties. Job growth moderated significantly during the 1980's with manufacturing jobs increasing by 2.5 percent in the less-urbanized counties and 13.7 percent in the completely rural counties.

Looking more closely at employment during the entire 1980's shows that all county-types lost significant manufacturing employment during the recessions but that only nonmetro counties experienced any employment growth during the recovery. In urbanized nonmetro counties, manufacturing employment grew nearly eight percent between 1982 and 1990 but this was less than half the 227,000 jobs lost during the recessions. The less-urbanized and the completely rural counties also lost a substantial number of manufacturing jobs - 330,000 or half again as much as were lost in the urbanized nonmetro counties. However, the less-urbanized and completely rural counties added 453,000 manufacturing jobs, 100,000 more jobs than were lost in the recessions of 1980 and 1982.

More Nonmetro Industries Added Jobs than Lost Jobs Over Decade

The wide difference between metro and nonmetro manufacturing job growth also shows up very clearly at a more detailed industry level. Over half of the twenty major manufacturing industries registered net job gains in nonmetro counties during the 1980's, compared to just two for metro counties. However, looking at detailed industries shows that the shift in manufacturing toward nonmetro counties was not due entirely to job growth but was also due to smaller nonmetro job losses for a number of important industries. For example, relatively large job losses occurred in two of the most important rural industries. Apparel and textiles together accounted for twenty-one percent of all nonmetro manufacturing jobs in 1977 but had lost 130,000 jobs by 1990. The losses in these two sectors accounted for 54 percent of the total number of jobs lost by nonmetro manufacturing industries. Despite these losses, the nonmetro employment share rose from 37 percent to 45 percent because metro employment in these two sectors fell by 585,000. Thus, compared to metro areas, nonmetro counties did relatively well. However, this increase in employment share is little consolation for the nonmetro communities that lost jobs in these two sectors.

Productivity Growth Lags Metro Industries

While we don't as yet have a complete understanding of why particular industries grow and others decline or why some regions grow and others decline it is clear that industries and regions that are in some sense more competitive will prosper. One of the key determinants of the competitiveness of a firm or an industry is its productivity. Firms that get more output from a given mix of inputs will, in general, be more competitive. And the more competitive firms will not only be more likely to grow and prosper, they will also be able to pay their workers more. Long-run productivity growth in rural industries is therefore crucial for the communities that depend on them. If rural industries are composed of high productivity firms, they will provide a more stable employment base and higher incomes for the communities. In contrast, if firms and industries in rural areas cannot maintain competitive rates of productivity gains, wages will not grow and ultimately, jobs will be lost.

Recent data from the Census of Manufacturing and the Annual Survey of Manufacturing indicates that rural industries are, in general, less productive than their urban counterparts (table 5). In 1977, value-added per worker in nonmetro manufacturing was 18 percent lower than in metro manufacturing. By 1990, this gap had increased to 23 percent. On a more detailed industry basis, only four nonmetro industries had higher value-added per employee than their metro counterparts. Furthermore, the gap between value-added per employee increased in all but five industries between 1977 and 1990. Some of this gap is the result of the fact that metro areas experienced much larger job losses in low-productivity industries such as textiles and apparel than did nonmetro areas.

Changes in productivity exhibit very large short-term variation so the relationships between productivity, wages, and job growth are strongest over longer periods. Even over this relatively short 13-year period the widening productivity gap has influenced relative wages. The three industries registering the largest decline in the ratio of nonmetro to metro wages were in the top four industries with the largest decline in relative productivity. Part of the reason nonmetro areas were able to increase their share of manufacturing employment in the face of declining relative productivity was the decline in relative wages.

Manufacturing Restructuring: Globalization, Flexibility, and Rural Economies.

We have, then, both good news and bad news regarding rural manufacturing. The good news is that manufacturing continues to add jobs in many nonmetro counties. The bad news is that the productivity of nonmetro manufacturing continues to lag metro manufacturing. To better understand how these trends are likely to continue, it is necessary to understand two major changes that are taking place within the entire manufacturing sector because these two factors will affect the ability of nonmetro areas to successfully compete for manufacturing jobs.

First, manufacturing is becoming increasingly global. Traditionally, rural manufacturing has been characterized by branch plants employing low-skilled labor to mass produce standardized products. Unfortunately, this type of production is perhaps the most likely to relocate abroad in the quest of yet lower-cost labor. Not only are low-skilled jobs the most likely to succumb to foreign competition, the workers losing these jobs as a result of foreign competition will have particularly difficult time finding alternative work because of their low skills. Thus, a major implication of globalization of manufacturing for rural areas is the potential loss of low-skilled jobs to less developed and emerging economies.

Second, the manufacturing industry as a whole is undergoing fundamental changes. Some of the most important of these changes are directly related to the adoption by manufacturing firms of more flexible production processes, including both technology and organization. Driven in part by the heightened global competition but also by rapidly advancing technology, many manufacturing industries are changing their production processes to allow faster product development, shorter production runs, and a greater variety of products at single facility or machine.

The trend towards greater flexibility has a number of important implications for the structure of manufacturing firms and establishments. In general, the adoption of flexible production practices leads to smaller factories or establishments, more nonproduction workers (administrators, engineers, marketing specialists, etc.) relative to the number of production or assembly-line workers, greater reliance and emphasis on timely information, and closer coordination and cooperation among machine makers, component producers, and product assemblers.

According to many researchers, all of these characteristics will contribute to increasing spatial concentration of manufacturing because they imply that firms located near other firms or in larger labor markets will be more productive than more isolated firms. In other words, the changes enumerated above imply that the importance of agglomeration economies is increasing. The presence of strong agglomeration economies reduces the ability of nonmetro areas to compete for manufacturing jobs. Strong agglomeration economies mean that any given combination of capital and labor will be less productive in rural than urban areas. In essence, an increase in agglomeration economies indicates an added urban advantage in terms of manufacturing location. With lower productivity, rural areas would have to compete on the basis of lower factor costs. The lower cost of land and buildings favors nonmetro areas. However, because labor costs make up such a large proportion of total costs in most industries, stronger agglomeration economies implies that lower relative wages would be necessary for many rural areas to compete successfully.

Recent work has shown that the agglomeration economies do indeed give a locational advantage to more urban areas. At the same time, there is evidence that the strength of agglomeration economies declined during both the 1970's and the 1980's, contributing to the shift in manufacturing employment toward nonmetro areas. However, as more and more manufacturing firms adopt new, more flexible production technologies, the likelihood that the urban advantage will strengthen in the near future is increased. If this occurs, rural manufacturing wages are likely to fall further behind urban manufacturing wages.

Where to From Here?

Whether or not rural manufacturing will continue to grow as it did in the 1980's will depend on a wide range of factors, many of which are beyond the control of rural residents and policy-makers. Changes in international trade and investment patterns and changes in the nature of manufacturing itself are factors that rural communities need to understand and be adapt to but over which they will have little if any influence. A key determinant of how well rural manufacturing adapts to this ever-changing environment is its ability to become more competitive and productive. During the 1980's, rural areas gained manufacturing jobs despite a fall in relative productivity but this was due at least in part to falling relative wages. With international competition for low-wage, low-skilled jobs and the potential of greater competition from urban locations for the firms adopting more flexible manufacturing processes, rural development policy is going to require new, more creative, more flexible programs that will enhance the productivity of rural manufacturing.

Table 1 Goods Producing Industries Share of Total of Jobs			
	1969	1979	1990
Metro	26.2%	21.8%	16.0%
Nonmetro	37.7%	33.8%	27.7%
Urbanized	33.1%	28.9%	22.7%
Less-Urbanized	39.9%	36.3%	30.4%
Rural	42.9%	38.4%	32.7%
Source: U.S. Dept. Commerce			

Table 2 Nonmetro Manufacturing Jobs Share of Goods Producing Industries			
	1969	1979	1990
Metro	89.9%	87.8%	85.8%
Nonmetro	54.5%	57.8%	62.2%
Urbanized	70.0%	70.5%	72.6%
Less-Urbanized	51.2%	55.6%	61.0%
Rural	28.7%	34.5%	41.5%
Source: U.S. Dept. Commerce			

Table 3 Change in Manufacturing Jobs		
	1970's	1980's
Metro	251,124	(1,760,312)
Nonmetro	708,036	10,929
Urbanized	164,516	(108,412)
Less-Urbanized	469,844	74,618
Rural	73,676	44,723
U.S. Total	959,160	(1,749,383)
Source: U.S. Dept. Commerce		

Table 4 Growth Rates of Manufacturing Jobs		
	1970's	1980's
Metro	1.5%	-10.4%
Nonmetro	18.0%	0.2%
Urbanized	10.2%	-6.1%
Less-Urbanized	22.8%	2.9%
Rural	29.1%	13.7%
U.S. Total	4.7%	-8.1%
Source: U.S. Dept. Commerce		

Table 5 Value-Added Per Worker (\$1,000)				
	1977	1987	1989	1990
Nonmetro	27.1	55.4	61.3	62.0
Metro	33.2	68.9	77.5	80.2
Ratio	81.9%	80.4%	79.1%	77.3%
Source: Census of Manufactures				

Outlook '93

For Release: Thursday, December 3, 1992

CAN RURAL WORKERS COMPETE FOR THE JOBS OF THE FUTURE?

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Introduction

In an era of intensified global competition and rapidly changing technologies, workers with "world class" skills will have the best chance of enjoying high wages and job security. Historically, the rural workforce has been less educated than their urban counterparts and rural areas were especially hard hit by economic restructuring during the 1980's. This coincidence suggests that many rural workers may not have enough of the right skills to compete for the jobs of the future.

The purpose of this paper is to assess the educational and skill levels of rural workers. We look first at educational attainment in rural areas, then at educational achievement (i.e., how much rural students learn while in school), and finally at the job training received by rural workers after they leave school. Our analysis highlights several important shortcomings of rural education and training, but also surprising strengths. We conclude with a brief discussion of the policy implications of our analysis.

Educational Attainment

The most widely used measure of educational level is the highest grade completed, commonly referred to as educational attainment. 1990 Census data indicate that nonmetropolitan (nonmetro) adults have somewhat lower educational attainment levels than their metropolitan (metro) counterparts (Table 1). In contrast to earlier historical periods, however, the metro and nonmetro distributions are quite similar. In both areas, a typical worker has a high school diploma but not a bachelor's degree. This broad middle of the education distribution comprises 55 percent of the metro workforce and a nearly identical 56 percent of the nonmetro labor force.

A rural gap in educational attainment is evident, however, both at the top and at the bottom of the distribution. In 1990, 31 percent of the nonmetro population age 25 and older had not finished high school compared to 23 percent of the metro population. A rural gap in educational attainment is also evident at the top end of the distribution. Forty-eight percent of metro adults attended at least some college, 23 percent earned a bachelor's degree, and 8 percent a professional or graduate degree. The corresponding nonmetro

shares were significantly lower at 35, 13, and 5 percent.

The negative association between educational attainment and rurality is even more evident when a more detailed classification of nonmetro areas is adopted (Figure 1). The share of adults not graduating from high school rises from 27 percent in nonmetro counties with urban populations of at least 20 thousand to 34 percent in totally rural counties, while the share earning at least a bachelor's degree falls from 16 to 11 percent. But, the association of low educational attainment with rurality is neither simple nor uniform. Regional differences, for example, are pronounced, with much of the nonmetro gap in high school completion due to pockets of very low education in the rural South. Furthermore, the most urban areas in America (i.e., central counties in the largest metropolitan areas) also contain a high proportion of high school dropouts. Unlike rural counties with high dropout rates, however, these "inner-city" counties also contain large numbers of persons completing four or more years of college.

Historically, educational attainment in rural areas has lagged that in urban areas, but the long-term trend has been for the gap to close and this convergence continues to be evident when high school completion rates are calculated for younger cohorts: between 1971 and 1991, the nonmetro gap in high school graduation was halved (Table 2). In a break with earlier trends, however, the rural-urban gap in completing a bachelor's or more advanced degree increased after 1971. The share of the metro population, ages 25-44, with at least four years of college increased by 10.8 percentage points between 1971 and 1991, while the nonmetro increase was a smaller 5.4 points. This divergence exaggerates rural-urban differences in school continuation, because it reflects, at least in part, an intensified rural brain-drain: rural youth attending college increasingly migrated to urban areas where the economic returns to their education were higher.

These rural-urban comparisons of educational attainment indicate some grounds for concern, but do not suggest that employers considering locating or expanding in rural areas will be deterred by generally low educational levels. Nonetheless, high school dropout rates remain too high in many rural areas, especially in the South. These attainment data also suggest that rural youth planning to remain in their home community may be discouraged from obtaining a college education.

Educational Achievement

The data in the previous section suggest that the educational attainment levels of average rural workers are less of a problem than generally supposed. However, it could be objected that the attainment levels of these rural workers are not the issue, achievement levels are. In other words, the typical rural student may now be staying in school and getting a diploma, but he or she may be learning much less than his or her urban counterpart. By this logic, the current abundance (by historical standards) of rural high school graduates could be deceptive: these graduates may not know enough to be good workers. A related quality concern is that rural high schools may not adequately prepare their best students for the most challenging colleges and

universities. Thus, the quality of the rural education could still be a severe problem despite the obvious upgrading in terms of years of schooling.

Fortunately, a data set does exist that allows this argument to be evaluated directly. This is the National Assessment of Educational Progress (NAEP), a continuing national probability survey of the cognitive achievement levels of U.S. students. The NAEP tests up to 100,000 students a year, distributed so that 4,000-6,500 students are tested in a given subject at each of three grade levels. By obtaining metro/nonmetro and, in some cases, county identifiers for individual cases on the NAEP data files, we were able to assess the cognitive achievement levels of rural students and their relation to urban student achievement levels.

The specific results we present are from the 1988 and 1990 NAEP surveys and cover a diversity of subject areas. We could only perform metro/nonmetro comparisons for the 1988 data on reading, history, civics, geography and writing. We had county identifiers for the 1990 data on math and science, however, that allowed us to use more detailed urban-rural categories.

Table 3 shows the average achievement scores of metro and nonmetro 12th graders, for reading, history, civics, geography, writing, and detailed science and math subject areas. The data in the table are quite clear: average levels of achievement in these subjects vary by only trivial amounts across metro and nonmetro areas. Indeed, while the pattern of results does suggest a very slight metro advantage, the only statistically significant differences between the two areas are in reading and two subfields of math (algebra and functions, and measurement), and these differences are all less than 5 points on a scale that ranges theoretically from zero to 500. (Over 90 percent of 12th graders actually score between 225 and 375, still a large range.) And, there is even one subject (writing) where nonmetro students score a little higher than their urban counterparts. These data hardly suggest that rural children are being shortchanged in what they learn in school.

Further disaggregation of the 1988 data into census regions (Table 4) confirms the general pattern of only small differences between metro and nonmetro average achievement levels. Besides this general pattern, two other findings deserve note here. The first is that the region where nonmetro 12th graders have the worst relative performance is the South. Even here, differences are not large (no more than 9 points in any one subject), but it does suggest that if a case is to be made about a general rural achievement deficit, it should be confined to rural areas in the South.

The second is that in the Northeastern and Midwestern states nonmetro students generally score higher than metro students. This is particularly noticeable for nonmetro science students in the Midwest, whose average science score is a statistically significant 12 points higher than metro science students. This illustrates just how far off it is to assume that a rural high school diploma is necessarily worth "less" than an urban diploma. In some areas, the rural high school diploma may even be the superior credential.

Table 5 provides further geographic detail on science and math achievement. The breakdown here is by modified Beale code region, and provides an ordinal classification of counties going from least rural (central counties of metro areas of population one million or more) to most rural (completely rural counties). These data show that the slight metro achievement advantage shown in Table 3 is driven by the relatively low scores in the two most rural nonmetro categories (nonmetro counties with urban populations of less than 20,000 and completely rural counties). The third nonmetro category (nonmetro counties with urban populations of 20,000 or more) actually had average scores higher (with one exception) than all metro categories. And, even the two low achievement nonmetro categories trail the highest achievement metro category (fringe counties of metro areas of population one million or more) by only 13-15 points. Again, these differences suggest no profound achievement disadvantage for rural students.

While average metro and nonmetro achievement levels are similar, it could still be argued that metro students are more likely to reach advanced levels and that, therefore, the equality of averages across metro and nonmetro areas masks serious differences in educational quality for the best students. Table 6 addresses this issue by displaying the percentages of students in each area performing at levels which roughly correspond to "medium" and "advanced" (typically 300 and 350 points, respectively). The percentages in Table 6 should only be compared within a subject area (i.e., horizontally), because the NAEP scores are not designed to be comparable across subject areas. For example, the fact that fewer students score "medium" in reading and writing than in the other subjects may not indicate that student achievement is lower in these subjects.

Though metro students again appear to have a slight advantage, these data do not suggest large differences in the percentage of students in metro and nonmetro areas obtaining medium to advanced scores. In terms of attaining the medium level of achievement, the largest differences are around 5 percentage points and only the difference in reading levels is statistically significant. The percentage point differences in the share of students at the advanced level of achievement are also small, with the largest difference only about 3 percentage points. However, because even in metro areas only 3-10 percent received advanced scores, these relatively small nonmetro gaps are large in a proportional sense and probably indicate lesser opportunity for rural students to receive a superior secondary education.

The data in Table 7 compare the access of metro and nonmetro students to advanced courses and confirm important differences in opportunities to train for further achievement beyond the standard high school curriculum. Most striking is the poor access of rural students to advanced academic courses. For example, only 23 percent of rural students attended a school where A.P. American history was offered, compared to 57 percent of urban students. The other rural/urban differences on A.P. access are also large and statistically significant. The rural disadvantage is also large for calculus and advanced science classes.

Another interesting finding is that fewer than half of all rural students (47

percent) are enrolled in an academic/college preparation program, compared to 60 percent of urban students (Table 8). Overall, the data suggest that, while most rural students may not be being shortchanged by the education received in high school, the brightest students may have less opportunity to pursue more elite levels of education than their urban counterparts. This, in turn, would suggest that, if higher college graduation rates in rural areas are deemed desirable, the focus should be less on the content of the basic education rural students receive--apparently adequate, at least in relative terms--and more on programmatic opportunities to pursue elite levels of education.

Vocational Training

Job skills are not limited to the academic skills emphasized in school. A bachelor's or professional degree is the key qualification for the minority of workers in certain professional, technical, and managerial occupations. For the rest of the workforce, however, post-school vocational training, such as formal company training programs and informal on-the-job instruction, is a more frequent source of job qualifications. A comprehensive assessment of the workforce preparation system in rural areas must therefore encompass post-school vocational training.

Do rural workers have adequate training opportunities after joining the labor force? Data for 1991 suggest that rural workers do not have as many opportunities to improve their job skills as urban workers (Table 9). The rural training deficit is fairly small (40 percent of nonmetro as compared to 43 percent of metro workers had received training on their current job), but it is worrisome that this gap in training rates opened up between 1983 and 1991. Although some U.S. employers appear to have concluded that their long-run competitiveness requires increased investment in workforce training, this trend was much stronger in urban areas.

A second concern is that enterprise-based training is least available to the rural workers in greatest need of improved vocational skills. Workers with low levels of formal education also receive much less post-school training and may become trapped in low-skill jobs. The overall rural gap in job training may, thus, be closely related to the lower educational attainment of the rural workforce. Training rates are also low for racial and ethnic minorities. Only about one in four rural Blacks and Hispanics report any training on their job as compared to over 41 percent of other (predominantly White) rural workers. Finally, training rates are quite low in the rural South, where educational attainment is lowest and most nonmetro Blacks and Hispanics live.

The training provided to rural workers also differs in several respects from that provided to urban workers (Table 10). One difference is that nonmetro workers receive less training in managerial and computer skills than metro workers. A second is that nonmetro workers are less likely to participate in formal company training programs. This is probably due, at least in part, to the smaller size of rural firms. Most small firms can not afford to establish formal training programs and must instead rely on either informal instruction from co-workers or external training providers. Among external providers, nonmetro firms differ from metropolitan employers by relying more on private

vocational schools and less on four-year colleges. Unfortunately, many rural firms are not located near any public or private schools that can provide specialized vocational training for their workforce.

Conclusions

It appears that the broad middle of the rural workforce is receiving a solid education--at least in relative terms.¹ The quality of these workers should provide no special deterrent to rural development. It follows that education's potential as a rural development strategy, by itself, is probably quite limited. Nonetheless, our analysis highlights several weaknesses in rural education and job training that should be addressed as part of broader strategies to revitalize the rural economy. Our analysis also reveals important regional differences with educational and training deficiencies apparently most severe in the South.

The relatively large proportion of high school dropouts in some --particularly southern-- rural areas is a cause for concern. Fortunately, it would appear that, if larger proportions of rural youth can be convinced to stay in school, they should receive an education comparable to that available in urban areas. Thus, dropout prevention should be an efficacious way to improve the skill credentials of that portion of the rural workforce.

Perhaps the most widespread problem with rural schooling lies in the need to increase opportunities for students to pursue advanced education. Our results strongly suggest that rural students are being shortchanged on this score, despite the relatively good quality of the basic education those in high school are receiving. Moving forward on this front may therefore be the key to closing the rural-urban gap in college graduation rates. If job opportunities for workers with advanced degrees continue to be scarce in rural areas, however, many rural youths graduating from college will probably continue to move to the Nations' cities.

A final concern is that post-school job training programs do not appear to reach many rural workers who lack a college degree. Limited training opportunities for noncollege educated workers is a national problem, but is more severe in rural areas, probably due to the lower educational attainment of the rural workforce (together with the tendency for enterprise-based training to focus on professional and other highly educated workers), the typically smaller size of rural employers, and more limited access to two-year colleges and other external sources of vocational training. As the nation moves to upgrade vocational training for the "bottom-half" of the workforce, the full participation of rural workers needs to be ensured.

¹ It is possible that educational achievement needs to be upgraded across the board to boost U.S. competitiveness. But this is a national concern, equally applicable to rural and urban areas. For more discussion of this point, see Teixeira and Swaim (1991), Mishel and Teixeira (1991) and Teixeira and Mishel (1992).

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Figure 1. Educational Attainment by Area, 1990
Adults ages 25 and older

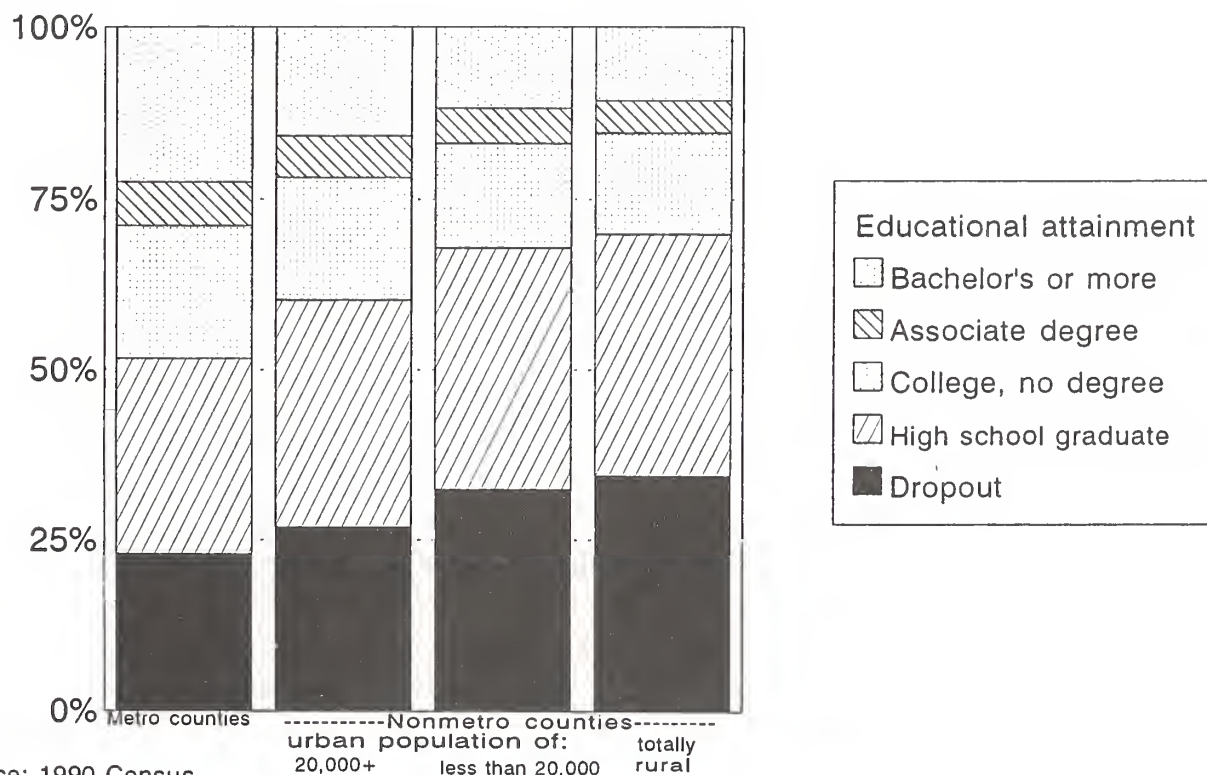


Table 1 - Educational Attainment of Persons Aged 25 and Older, 1990

Schooling Completed	Metro	Nonmetro
	-----percent-----	
Graduate or professional degree	8.0	4.5
Bachelor's degree	14.5	8.5
Associate degree	6.4	5.4
Some college, no degree	19.5	16.1
High school graduate	28.6	34.7
High school dropout	23.0	30.8

Source: 1990 Census.

Table 2 - Educational Attainment of 25-44 Year-Olds, Selected Years

Item	1971	1975	1979	1983	1987 ¹	1991
Completed						
high school:						
Metro	73.7	79.6	83.2	85.7	87.1	87.7
Nonmetro	65.6	70.7	77.8	80.8	82.7	83.7
			Percentage points			
Nonmetro gap	8.1	8.9	5.4	4.9	4.4	4.0
Completed 4 or more						
years of college:						
Metro	17.0	21.4	24.0	26.8	27.5	27.8
Nonmetro	10.8	13.8	17.5	18.0	16.2	16.2
			Percentage points			
Nonmetro gap	6.2	6.6	6.5	8.8	11.3	11.6

¹ The metro/nonmetro classification of counties was revised between 1983 and 1987 using 1980 Census data.

Source: Current Population Survey

Table 3 - Mean Achievement Scores of 12th Graders

Subject	Metro	Nonmetro
Reading*	288.0	284.1
History	295.7	292.8
Civics	296.6	296.0
Geography	293.5	291.2
Writing	223.9	224.8
Science Composite	293.7	292.4
Life Sciences	295.8	295.4
Physical Sciences	291.2	289.0
Earth and Space	291.8	290.6
Nature of Science	298.6	296.9
Math Composite	296.3	293.1
Algebra and Functions*	298.0	293.6
Geometry	297.5	293.0
Measurement*	295.3	291.6
Numbers and Operations	295.0	292.4
Data Analysis and Statistics	295.3	295.0
Estimation	293.1	293.7

*Metro-nonmetro difference is significant at the 95 percent level of confidence.

Source: 1988 and 1990 National Assessment of Educational Progress.

Table 4 - Mean Achievement Scores of 12th Graders, by Region

Subject	Northeast		Midwest		South		West	
	Metro	Non-metro	Metro	Non-metro	Metro	Non-metro	Metro	Non-metro
Reading	286.9	289.8	289.5	286.7	287.8	279.7*	288.2	286.7
History	297.0	298.6	298.0	297.6	290.6	287.7	295.7	292.6
Civics	293.9	297.2	298.5	304.8*	294.0	286.8*	299.4	299.5
Geography	293.4	306.1*	298.1	298.8	284.5	280.9	295.7	292.2
Writing	231.8	222.8	221.0	230.4	215.9	218.9	223.2	228.1
Science Composite	298.5	303.7	291.6	303.5*	281.7	275.8	297.3	293.9
Math Composite	301.0	303.9	296.9	299.4	287.8	279.3*	296.3	296.3

*Metro-nonmetro difference is significant at the 95 percent level of confidence.

Source: 1988 and 1990 National Assessment of Educational Progress.

Table 5 - Mean Math and Science Scores by Detailed Rural/Urban Categories

County Type	Math	Science

Metro areas:		
Central counties of metro areas of population 1 million or more	292.9	289.7
Fringe counties of metro areas of population 1 million or more	302.0	299.1
Counties in metro areas with populations of 250,000 - 1 million	297.3	295.4
Counties in metro areas with a populations less than 250,000	291.9	289.8
Nonmetro areas:		
Nonmetro counties with urban populations of 20,000 or more	299.9	303.3
Nonmetro counties with urban populations of less than 20,000	289.5	286.1
Nonmetro counties with no urban population (totally rural)	287.3	286.3

Source: 1990 National Assessment of Educational Progress.

Table 6 - Percent of 12th-Graders Performing at "Medium" and "Advanced" Levels

Subject	Medium Score or Better		Advanced Score or Better	
	Metro	Nonmetro	Metro	Nonmetro

Reading	38.3	33.5*	2.7	1.4*
History	47.2	41.8	5.1	3.0
Civics	49.0	49.1	6.0	6.2
Geography	46.3	42.4	5.3	3.7
Writing	29.9	30.2	6.5	5.8
Science Composite	45.0	43.6	9.7	6.9
Math Composite	47.1	42.3	5.2	3.6

*Metro-nonmetro difference is significant at the 95 percent level of confidence.

Source: 1988 and 1990 National Assessment of Educational Progress.

Table 7 - Availability of Advanced Curricula to 12th-graders

School offers:	Metro	Nonmetro

	percent of students	
Advanced placement course in:		
American government*	21.8	6.6
American history*	57.3	23.1
English language*	54.1	29.5
English literature*	59.9	24.6
Calculus*	89.9	47.8
Second-year biology*	74.9	68.8
Second-year chemistry*	61.7	45.7
Second-year physics*	31.8	7.7
Computers used as part of instruction	44.7	45.9

*Metro-nonmetro difference is significant at the 95 percent level of confidence.		

Source: 1988 and 1990 National Assessment of Educational Progress.

Table 8 - Distribution of 12th Graders by Academic Track and College Enrollment

Item	Metro	Nonmetro

	percent of students	
Enrolled in:		
Academic/college preparation program*	59.6	47.2
General education program*	28.7	31.1
Vocational/technical program*	15.1	22.5
Will go to a vocational/2-year college	28.5	32.6
Will go to a 4-year college*	52.9	43.5

*Metro-nonmetro difference is significant at the 95 percent level of confidence.		

Source: 1988 and 1990 National Assessment of Educational Progress.

Table 9 - Skill-Improvement Training on Current Job, 1983 and 1991

Group of workers	Metro		Nonmetro	
	1983	1991	1983	1991
	-----percent receiving training-----			
All workers	36.8	43.4	36.8	39.9
Gender:				
Men	37.6	43.1	37.2	39.3
Women	35.9	43.7	36.3	40.6
Race/Ethnicity:				
Hispanic	23.2	29.5	24.1	27.3
Black (nonhispanic)	30.7	37.4	27.8	27.1
White (nonhispanic)	38.7	45.9	37.8	41.4
Education:				
Dropout	17.1	19.3	19.0	18.2
High school graduate	31.0	35.8	33.3	34.7
1-3 years college	42.2	47.8	44.5	49.0
4 years college	51.1	57.9	55.3	65.3
5+ years college	60.5	67.8	68.4	72.8
Region:				
Northeast	31.9	40.0	38.6	42.6
Midwest	37.6	44.8	36.7	42.1
South	37.6	44.8	34.0	36.3
West	40.6	43.2	41.7	44.0

Source: January 1983 and 1991 Current Population Surveys.

Table 10 - Types and Sources of Skill-Improvement Training for Workers Receiving Training on their Current Job, 1991

Training Type/Provider	Metro	Nonmetro
	---percent---	
Type of training:		
Managerial	27.9	23.7
Computer	34.7	29.3
Academic (Three R's)	14.5	14.6
Other technical	62.9	66.4
Training provider:		
School	32.0	33.3
Company program (formal)	42.5	37.1
On-the-job (informal)	39.7	39.4
If school:		
High school vocational educ.	4.4	4.0
Private vocational school	9.7	13.3
Two-year college	41.0	41.5
Four-year college	50.5	46.8

Source: January 1991 Current Population Survey.

Outlook '93

For Release: Thursday, December 3, 1992

**U.S. AGRICULTURE EXPORTERS NEED TO
STAY COMPETITIVE**

Peter Friedmann
Executive Director
Agriculture Ocean Transportation Coalition

The Agriculture Ocean Transportation Coalition is a broad coalition of organizations and companies involved in the largest American export sector: agriculture.

The AgOTC membership believes changes in the Shipping Act of 1984 are long overdue. Ocean transportation regulation is outdated, and the result is substantial and growing injury to the U.S. economy in general.

We have documented cases in which the current regulatory scheme is costing U.S. jobs, forcing companies to relocate production facilities abroad. It is creating a severe competitive disadvantage for U.S. companies attempting to compete in an increasingly small global marketplace. The current scheme distorts the relationships between carriers and their customers, preventing a mutually beneficial relationship between the individual customer and its chosen transportation vendor. Finally, we believe that the current situation injures U.S. flag carriers, because it denies them the opportunity to benefit from the particular advantages they enjoy over their foreign flag competitors.

During the past year, AgOTC worked to generate support in both the Executive Branch and on Capitol Hill for these much needed changes in the Shipping Act of 1984. We are encouraged that Senators and Congressmen understand that ocean shipping impacts their constituents and livelihoods nationwide, and intend to build upon this support and seek passage of Shipping Act amendments during the 103rd Congress.

From Our Perspective: The Recent Pact

Last year, President Bush appointed a public-private commission to assess the impact of steamship cartels on the U.S. economy. At hearings around the country, witnesses representing virtually every industry testified that steamship cartels are

raising prices to U.S. consumers. The cartels are forcing jobs to be lost and companies to shift their manufacturing offshore in order to be competitive in the global marketplace.

This spring, the President created a task force to review U.S. maritime policy from 16 of his own Executive Branch agencies. Fourteen of those agencies agreed that steamship cartels are acting contrary to the interest of the U.S. economy, and recommended their powers should be curtailed or eliminated. Two agencies, the U.S. Department of Transportation (DOT) under Secretary Andrew H. Card, Jr., and the Federal Maritime Commission (FMC), came up with a strange alternative. They proposed a new subsidy program that would give \$1 billion essentially to two U.S. steamship lines over the next seven years. In spite of the fact that the President's Policy Task Force voted 14 to 2 to cut back the power of the steamship cartels in order to help U.S. industry compete abroad, the DOT and FMC alternative was accepted by the Administration. Secretary Card then sent a bill to Congress to create the new \$1 billion subsidy, testified before Congress, and sought to push the subsidy program through in record time.

Merchant Marine Subcommittees in both the House and the Senate conducted hearings. Only steamship owners and shipbuilders were allowed to testify. Despite repeated requests, none of us who would be asked to provide the cargo and foot the bill, were heard.

The fact is that some of these cartels are so powerful they refuse to sign contracts for cargo, denying U.S. companies the ability to operate and meet demand for their products efficiently, and they do not allow a U.S. exporter to sign a contract with a U.S. steamship line or any other carrier of their choosing. Cartels in both the Atlantic and Pacific have taken some of their container capacity off the market, artificially adjusting the supply of containers to increase demand, and thereby the price, of the available containers. They pool their revenues and profits and are allowed by law to "control, regulate or prevent competition in international ocean transportation".

Who benefits from these cartels? According to Maritime Administration figures, 80 percent of containerized cargo or liner cargo is carried on foreign-flagged vessels belonging to foreign companies. Eighty percent of the membership of these cartels is based in Japan, Hong Kong, Singapore and Europe. That means 80 percent of shipping price hikes benefit those foreign companies.

The AgOTC Legislative Agenda: Good for the U.S. Economy

The Shipping Act of 1984 is the law. It contains many provisions which are beneficial to both carriers and shippers and

indeed was a product of a compromise negotiated between carriers and shippers. We do not propose to eliminate the Shipping Act of 1984, but to fine tune it to bring it into conformity with developments and practices which have characterized domestic and international transportation since 1984. We're seeking to update the Shipping Act because it is woefully out of step with the real world of today's transportation and logistics.

What we want is what other nations have; what American industry needs is what our competitors abroad already have: the ability to enter into commercially viable arrangements and negotiations with the ocean carriers of our own choosing. These include, specifically, the right to contract with the individual ocean carrier, and to assure that the terms of that contract will be maintained in confidence between that carrier and that shipper. In addition, it is essential that competition be maintained, particularly in the Atlantic and Pacific, where we have seen trade-wide agreements to reduce capacity among both conference and non-conference lines, to the detriment of U.S. consumers and U.S. exporters.

We believe the following amendments which were incorporated in Congressman Tom Carper's bill, the Shipping Act of 1992 (H.R. 5841), during the 102nd Congress would achieve these objectives, to the benefit of every export and import business in the United States.

Ocean Contracting: The U.S. is the Only Country to Prohibit It

First, the mandatory right of independent action, which currently exists for tariffs, must be expanded to include service contracts. This would allow a contract to be negotiated with an individual carrier, without interference, administration, or manipulation by the conference.

As anyone who has ever negotiated any contract knows, it is impossible to negotiate simultaneously with 13 different vendors. It is even more difficult to successfully negotiate a meaningful contract when each vendor has the veto power over another vendor's contract. Yet that is precisely the position we are in today, where the TransPacific Westbound Rate Agreement determines that it won't sign any contracts at all, or, in the Atlantic, where the TAA establishes such conditions as a minimum contract of 250 FEU per year. (I might note that conferences always talk about the need to look out for "the little guy". As one of the "little guys", I cannot understand how an arbitrary minimum 250 FEU volume commitment benefits me. For all their protestations to the contrary, carriers really only want to deal with "the big guys".)

Secondly, no negotiation can be meaningful unless both parties

know that the result of those negotiations will be confidential. Thus we seek, and the Carper bill would have provided, the elimination of the current filing requirement for contracts. (Tariff filing requirements would remain intact.)

I would note that when talking to steamship company executives, most agree privately that it is time for confidential ocean contracts. Confidential contracting currently exists in truck, rail, and international aviation. When ocean carriers negotiate their contracts with Union Pacific or Burlington Northern, for example, the terms of those contracts are maintained in strict confidence. This benefits the ocean carriers as well as the railroads, yet the carriers would deny us, their customers, the similar benefit. If a U.S. company wants to export products from U.S. ports, it must disclose its shipping costs to competitors worldwide. Japanese companies are not required to make such disclosures. As a result, competitors of U.S. companies know our costs, but we don't know theirs -- an obvious unfair advantage. A number of U.S. companies have found it less burdensome to export through Canada or Mexico, or even ultimately to shift production outside the U.S., in order to avoid being compromised by FMC regulations that benefit only the cartels.

As a practical matter, I happen to believe in many cases carriers would receive more revenue than they presently do, once traffic managers are freed from the pressure of proving that he can get just as good or better deal than his peers. Once the contract terms are confidential, this competition to drive the price down will be eliminated.

Many of my friends in the steamship business ask if I really did not want to know what my competitors are paying for transportation. To them, I would say that this is not a hypothetical question. For the last decade, we've been operating under such a confidential contracting system in rail, trucking and in aviation. We know how it works; both large and small companies like confidentiality and the complete freedom to negotiate truck and rail arrangements. To us, true negotiating flexibility and confidentiality are not new concepts, but tried and tested practices which characterize all aspects of our business lives. Only in ocean transportation are hindered by the outmoded restrictions contained in the Shipping Act of 1984, which AgOTC seeks to amend.

Assuring Competition

AgOTC members believe that the limitation of the size of trade-wide agreements is essential. Even the contracting amendments, which would help immensely, are insufficient when carriers are able to form trade-wide agreements and include virtually all carriers in any given trade route. Presently, the TransPacific Agreement and the Trans Atlantic Agreement set rates,

reduce capacity, and create an array of restrictions on what should be commercial freedom between a carrier and his customer (for example, the 250 FEU contract minimum set by TAA).

For this reason, included in the amendments which we seek would be a limitation on the size, measured in capacity, of any agreement benefitting from antitrust immunity. In the Carper legislation, this was 60% of available capacity. In amendments that were being considered by other Congressmen and Senators during the 102nd Congress, antitrust immunity would have been limited to 50% of capacity.

Virtually every shipper agrees that the superconferences which have emerged recently are extremely dangerous and contrary to the interests of the general economy of the United States and more specifically, to the individual companies who export or import. We are pleased to see that the European Community is scrutinizing the power that these cartels wield. We believe that the amendments we seek limiting antitrust immunity to capacity representing no more than 50% or 60% would assure meaningful competition and, most importantly, foster carriers' responsiveness to the needs of their customers, against which the TAA and TSA seem to insulate their membership.

A Win-Win For The United States

We have found that in every state of this country, there are industries, factories, and retailers who are being injured by the current outmoded regulation of ocean transportation which exists in the United States. To hold the entire economy of the United States hostage for the benefit of a liner industry dominated by foreign carriers is ludicrous. We have heard from some carriers that "the cargo will always be there." In fact, this is a dangerous assumption.

At present, there are a number of AgOTC members that have shifted at least some of their sourcing for foreign markets, from U.S. factories to their foreign factories. The departure of this production from American soil means the loss of American jobs to foreign labor. In some cases, the sole motivation has been to avoid the suffocating restrictions imposed by U.S. regulatory intervention in what should be a purely commercial relationship between a carrier and its customer. Who loses in such a situation? The U.S. economy loses and so do U.S.-flag carriers, who lose the opportunity to carry cargo to foreign shores, bound for foreign destinations.

I truly believe the amendments we seek will benefit both U.S. carriers and U.S. shippers. The U.S.-flag carriers are leaders in intermodal shipping and perhaps in the best position to tailor

transportation contracts to the needs of U.S. importers and exporters. But they won't have a chance unless ocean contracting practices catch up to truck, rail and air contracting.

The Agriculture Ocean Transportation Coalition worked hard this past year to gain Administration support for our Shipping Act amendments, and were successful with 14 agencies. Subsequently, we gained some critical Congressional support for our Shipping Act amendments. The need for the Shipping Act amendments we seek is becoming more apparent and urgent. AgOTC will pursue them vigorously in the coming 103rd Congress.

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